AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING

CIVILIAN AND DEFENSE

In This Issue . . . T-41 Tank Design • • • Welding Jet Engine Parts • • • Higher Core Output • • • Unique Handling of Chips and Cutting Fluids • • • Testing Brakes Under Severe Conditions • • • Scrap Drive Results

MARCH 1, 1952

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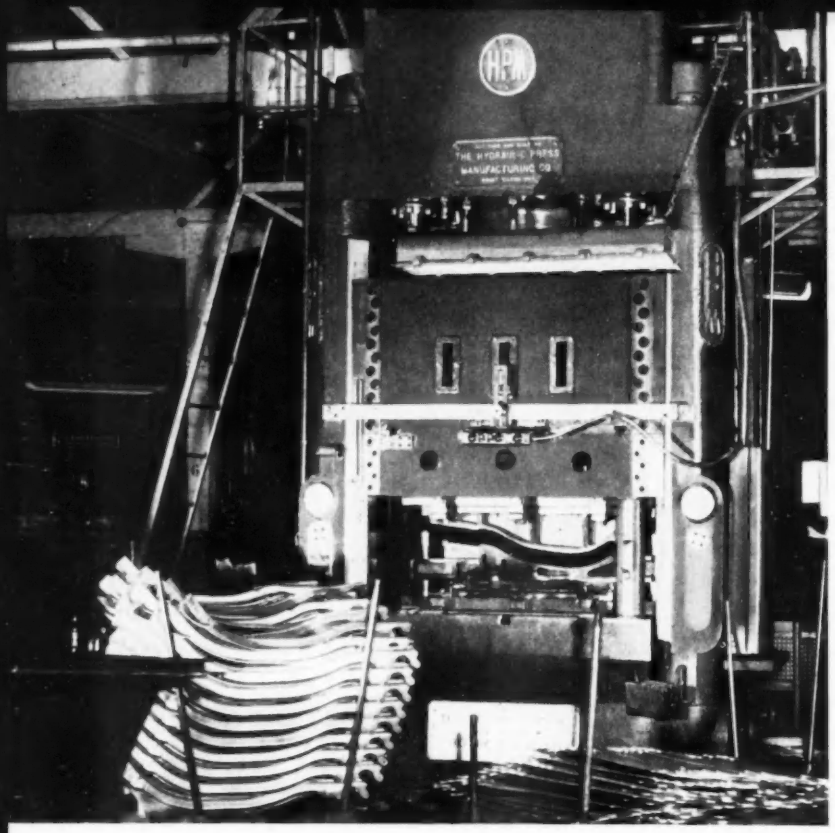
A CHILTON PUBLICATION



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THE BIG 400-ton hydraulic press shown above is used to stamp out parts for farm machinery in a big midwest plant.

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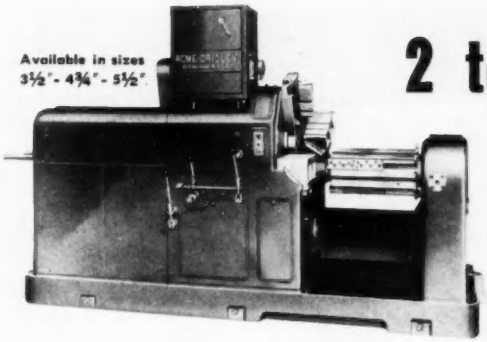

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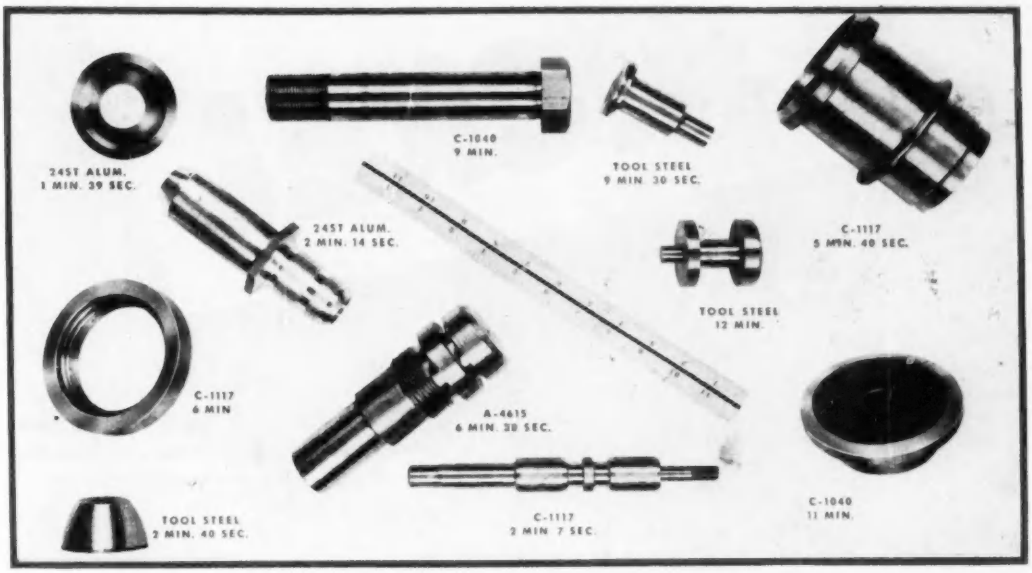

Can your present machining methods measure up to these proved examples of Model M production?

Parts shown range up to 8" long and 4" diameter. Lots run as low as 250 pieces, as high as 70,000. These parts, and hundreds of others, were switched from ordinary single spindle machines to the Model M. Here's why:

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AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

March 1, 1952 Vol. 106, No. 5

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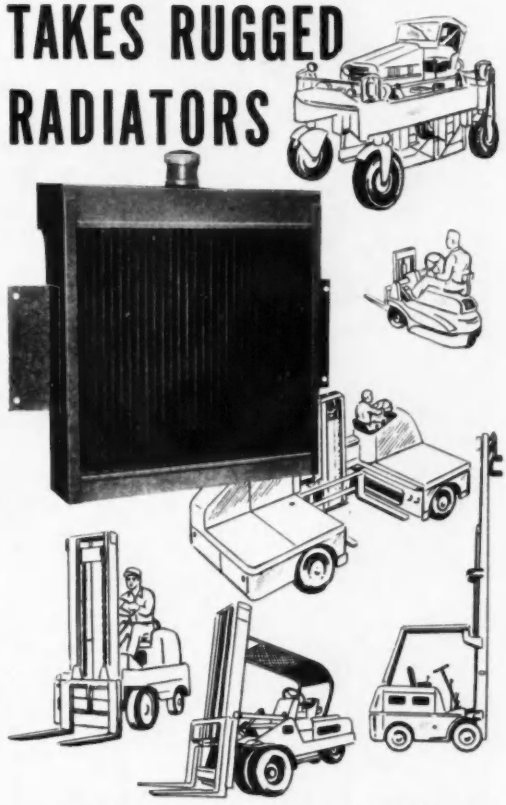

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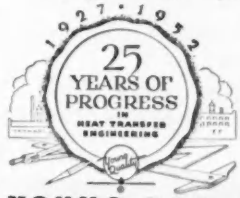

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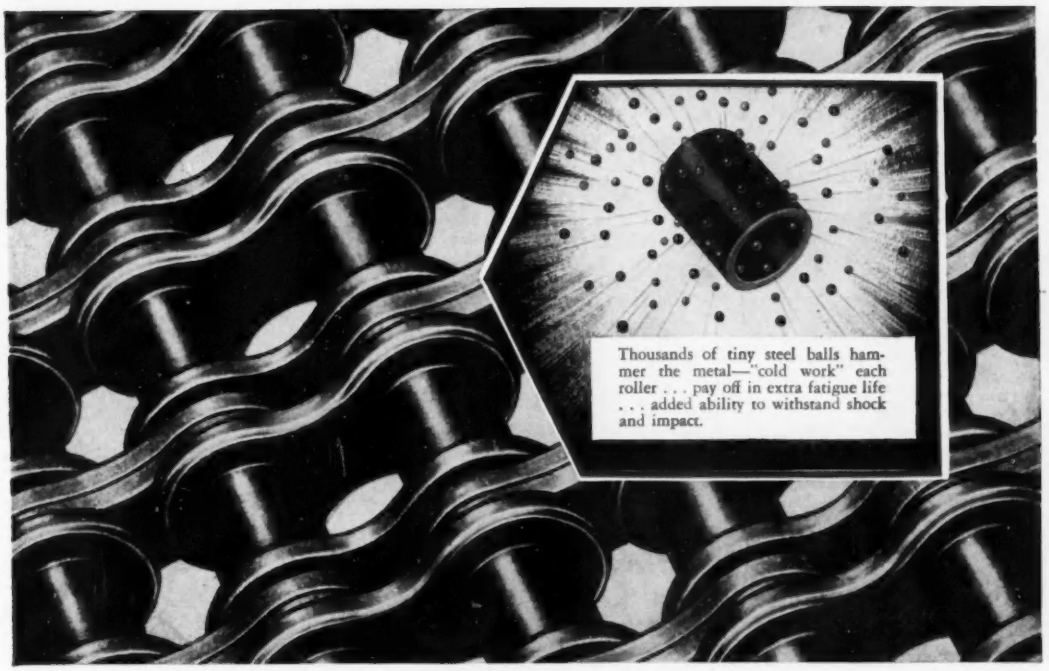
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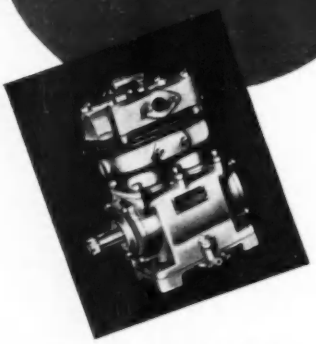

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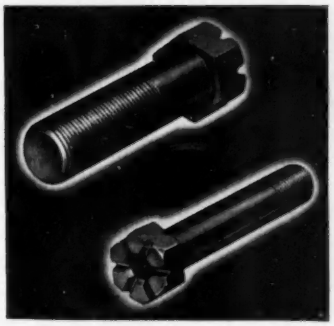

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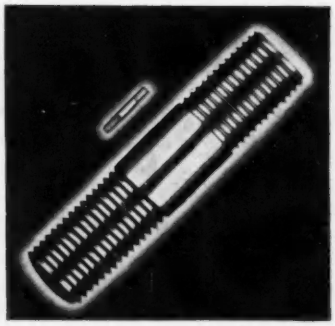

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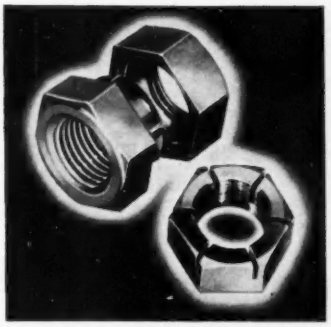

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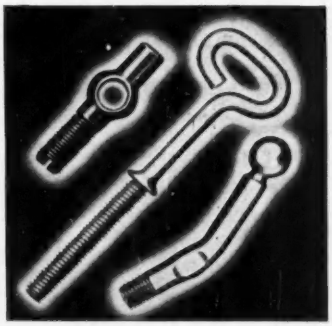

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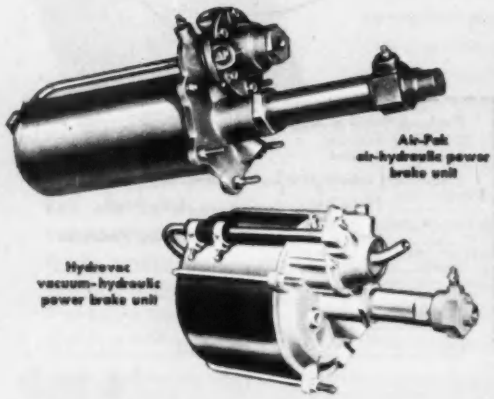

Air-Pak air-hydraulic power brake unit

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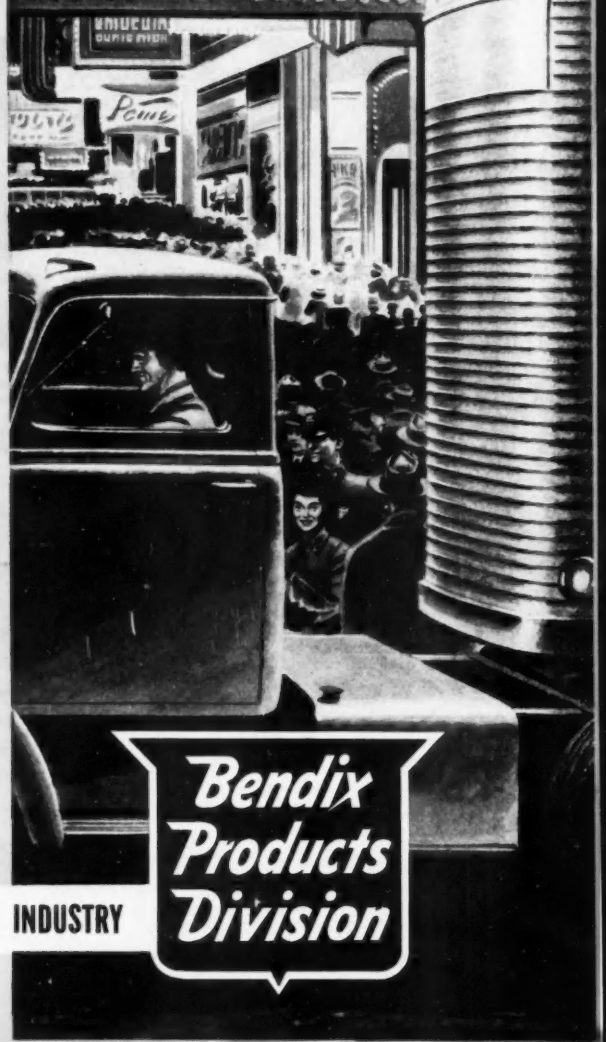

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High Spots of This Issue

Design Features of T-41 Tank

This interesting account tells of the Walker Bulldog Tank manufactured by Cadillac, powered with aircooled engine by Continental, having transmission manufactured by Allison Div. of General Motors, and a "Little Joe" auxiliary power plant produced by GM's Detroit Diesel Engine Div. Page 22.

Testing Brakes Under Severe Operating Conditions

To determine performance of brakes under worst possible conditions, Bendix installs them on a truck loaded with iron weights. Sent to rugged mountain test territory, these test trucks are in themselves mobile laboratories. See page 28.

Scrap Drive Has Reached Peak

How this is true — as respects the automobile industry — is divulged by Leonard Westrate, Detroit News Editor. Truth is, with the large manufacturers, the point of diminishing returns has been reached. For the facts, turn to page 30.

De Soto's Handling of Chips and Cutting Fluids

Second in a series on De Soto's new engine plant, this article discusses an unusual setup for chip disposal and for centralized distribution of coolants and cutting fluids. Page 34.

Willys-Overland's Latest Equipment

With recent introduction of its new line of passenger cars, Willys-Overland Motors Inc. has made some interesting changes in equipment and assembly procedures. See page 38 for photographs and full information.

19 New Products Items And Other High Spots, Such As:

Ford's engineering facilities; welding jet engine parts of heat-resistant metals; cores for castings increased six times; gear tooth cutting time reduced for tank turret rings; wider uses found for textured metals; and a story on new time-saving equipment for machining piston rings.

News of the Automotive Industries, Page 12
For Complete Table of Contents, See Page 3

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PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY • PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT • SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
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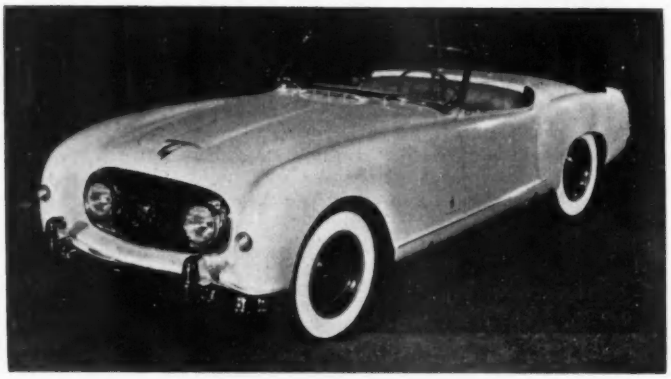
News of the AUTOMOTIVE



1952 NASH-HEALEY SPORTS CAR

Featuring hand-built body styling by Pinin Farina, noted Italian custom body designer, the 1952 Nash-Healey sports car was displayed for the first time recently. Engine and major mechanical parts are made by Nash in the U. S. while the chassis with front-end suspension are made by the Donald Healey Co. of England. The low-slung car is powered by the Ambassador six-cyl., overhead-valve, 125-hp engine with an aluminum cyl. head and a compression ratio of 8.0:1. Two British S.U. horizontal carburetors work in conjunction with an oversize intake manifold.

NPA Officially Cancels Fisher Lathe Contract

Now that the Government has officially confirmed cancellation of a $69 million contract, under which Fisher Body Div. of General Motors Corp. would have built Bullard turret lathes, a new machine tool contract will be assigned to the Division, according to General Services Administration. Fisher was almost ready to start production of parts in several cities for final assembly at Pittsburgh, Pa.

The contract was signed last September, but in the meantime the National Production Authority decided that, due to changes in jet engine design and production methods, the 757 lathes which Fisher was to have built would not be needed. The type of tools to be built by Fisher will be decided upon later.

1951 Showed Increase in Older Car Models

According to R. L. Polk and Co.'s recent annual inventory, there were 38,516,000 private passenger cars registered in the U. S. on July 1, 1951. Of these, 16,519,000, or 43 per cent, were pre-war models.

The report further stated that there were more cars in the 10-year and over class in 1951 than in 1950, and three times as many in this category as there were in 1941. For 1941, 1950, and 1951, the 10-year-old or older cars on the registration lists numbered 4,757,000, 14,827,000, and 15,533,000, respectively.

Automobile Firms Oppose Subsidy-Basis War Work

Although automobile companies have welcomed the possibility of more defense work, they are said to be opposed to the placement of orders which result in higher costs, even though these bring added employment to the automobile industry. Speaking for the industry, W. J. Cronin, managing director of the Automobile Manufacturers Association, told Defense Mobilizer Wilson that, despite a directive from the Comptroller General to the effect that contracts can be placed in labor distress areas at prices higher than the lowest bid, automobile companies do not seek preferential treatment or subsidies of any kind and are prepared to compete for defense work on the basis of services rendered.

He added that there is little prospect of short-term relief for Detroit unemployment to be found in additional defense contracts, since several months are required to get into production of even the simplest items; he went on to say that the real solution would be the allocation of more materials to permit higher automobile and truck production than has been proposed by the National Production Authority.

GE Announces Process for Fabricating Jet Blades

General Electric Co. recently disclosed that it has developed a new manufacturing process for the production of jet engine compressor blades by fabrication rather than by forging. The company claims that the process will result in appreciable savings in critical materials and costs, as well as speed up production. The process is to be made available, through the Air Force, to other jet engine manufacturers.

The company also revealed plans for a $30 million jet engine research and development project at its mammoth jet center in Lockland, O. Among the programs of the new facilities will be phases of the aircraft atomic power plant for the Air Force and the development of such new jet engines as the XJ-53.

It was also reported that the firm's defense production will probably equal from 30 to 35 per cent of its total output during 1952. Current prime contracts are said to amount to more than $600 million, and 17,000 suppliers are now working with GE in producing jet engines and aircraft instruments, radar and turbosuperchargers, guided missiles and torpedoes, gunfire systems for ships and aircraft, and other items.

Ford to Build Navy Jet Engine Plant

Ford Motor Co. will build a new jet engine assembly plant for the Navy near Romulus, Mich., at a total cost of about $50 million, including tooling and equipment. The new plant will be owned by the Navy and operated by Ford's Lincoln-Mercury Div. for producing J40 jet aircraft engines.

Approximately one-fourth of the new Lincoln-Mercury assembly plant being built at Wayne, Mich., will be used for fabrication and sub-assembly of J40 parts, but final engine assembly and testing will be done at the Romulus plant. Construction of the latter on a 160-acre site will start in March, and the building is expected to be completed in the spring of 1953. The main plant unit will contain about 500,000 sq ft of floor space, plus 18 engine test cells and a test building.

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The Wayne plant will be a dual-purpose one at which production of J40 assemblies and automobiles will be carried on simultaneously. According to present schedules, automobile production will be transferred from the present Lincoln plant in Detroit about mid-summer; installations of machinery for the defense program are to start in July.

Air Force Cuts Back GM Propeller Order

General Motors Corp. recently announced that its Air Force contract for production of propellers for Fairchild C-119 transport planes has been cut back. Therefore, they will not be produced by both GM's Aeroproducts and Frigidaire Divs., but only by the former branch.

Chrysler Wins Tank Parts Contracts

The Airtemp Div. of Chrysler Corp. has announced receipt of sizable contracts for the production of a T-46 range finder and a T-30 ballistic computer for the T-48 tank. The other is for the new T-41 range finder which Airtemp has been shipping to the Army since Sept., 1951.

No Jet Engines to be Built at GE Plant in Louisville

The effects of the Air Force's delayed production schedule are seen in a recent announcement by General Electric Co. that jet engines would not be built, as originally planned, at a projected new $14 million plant in Louisville, Ky. The company stated, however, that construction of the plant would proceed and that it would probably be used for home appliance production instead.

AI Staff Member Embarks on Tour of Ordnance Operations

Leonard Westrate, Detroit News Editor of AUTOMOTIVE INDUSTRIES and its associated publications, MOTOR AGE and COMMERCIAL CAR JOURNAL, left Feb. 26 on a 30-day tour of Army Ordnance operations. Although newspapers, wire services, business and news magazines, and the Automobile Manufacturers Association are represented in the small party of correspondents making the trip, the three publications mentioned above are the only automotive ones in the group.

By no means an all-expense "junket" at the taxpayers' expense, since the Army will furnish only air transportation and supervision, the trip is designed to acquaint newsmen with the design, development, and manufacture of Ordnance vehicles. They will also be given a first-hand opportunity to: observe vehicles being tested under various conditions of climate and terrain; watch their maintenance, repair, and modification; and see them under actual combat conditions with reference to performance, maintenance, rebuilding, and repair after service.

The itinerary of the tour will be as follows: Tank Arsenal and Ordnance Tank Automotive Center, Detroit Mich.; Aberdeen Proving Ground, Aberdeen, Md.; Lima Ordnance Depot, Lima, O.; Red River Arsenal, Texarkana, Tex.; Benicia Arsenal and Port of Embarkation, near San Francisco, Calif.; three days of Artic training and test activities in Alaska; installations in Japan and Korea, as arranged by the Far East Command; and a final stop in Honolulu, Hawaii, for a conference with the Commanding General, U. S. Army Pacific. A complete report of the tour will be carried in AUTOMOTIVE INDUSTRIES.

Better Materials Supply Spurs Hopes of Meeting Auto Quotas

There has been a great deal of uproar and confusion lately about the attrition schedules set by the National Production Authority for the automobile industry for the second quarter plus a good bit of speculation that even the lean quotas of 1,006,000 cars in the first quarter and the 930,000 limit for the April-May-June period will not be met.

As the war of words and press releases goes on, however, there appears convincing evidence that Washington planning has gone amiss. One example is the million lb of aluminum that has suddenly turned up for the automobile industry, after the Air Force turned back to NPA something over 15 million lb when it found that the metal could not possibly be used for aircraft production this year.

The facts appear to indicate that restrictions on civilian goods materials need not have been so severe and that now there is a growing supply which military production cannot possibly absorb at this stage of the defense program. In all fairness, it must be said that some materials, such as copper and nickel, are and have been critically short. However, so far as aluminum

THE 1952 HENRY J CORSAIR

The Corsair, a second model (the first was the Vagabond) of the 1952 Henry J, is offered by Kaiser-Frazer Corp. in both standard and deluxe types. Styling features include: a wide double-bar grille with built-in contour parking lights and a bronze "K" medallion; new type of hood ornament and model designation in script on sides of front fenders; and headlights on the crown of rear fenders. The interiors have been restyled considerably and a new glove compartment installed. Improved shock absorbers, new steering tie rods and clutch linkage, more efficient ignition and starting motor unit, and a radiator with increased cooling capacity constitute mechanical improvements in both four and six-cyl models.

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is concerned, there has been considerable doubt all along that the severe cutbacks were necessary, and this skepticism has been borne out by developments. In fact, it is reported that some automobile companies are being offered almost unlimited quantities of aluminum that they cannot accept because of NPA use and inventory regulations.

In view of the additional aluminum already allotted and good prospects that more will be forthcoming, it looks as though the industry will meet its quota in this quarter as well as in the second. Even though copper is allotted for only 800,000 cars in the second quarter, more aluminum will be available for substitutions, and there is even some belief that more copper may be made available.

Meanwhile, the new car sales picture has brightened, with reports of a fairly brisk pick-up starting early in February coming from car dealers. One of the arguments used in Washington has been that the industry could not sell more automobiles if additional materials were made available to build them. Actually, sales always are slow in the winter months, and it is in this period that field stocks are built up for the spring buying rush. With production cut back so sharply this year it has not been possible to build up dealer inventories, and it appears almost certain that there will be a shortage this spring if anything like the normal seasonal upturn in new car sales occurs.

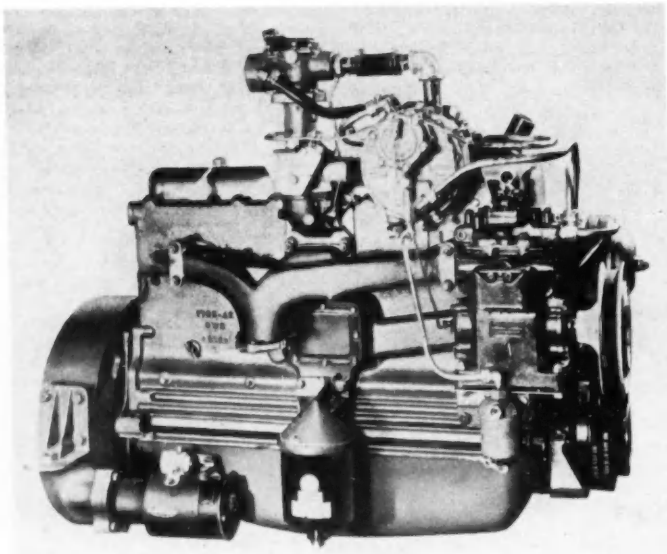
Twin Coach Offers Its Engines to Other Bus Manufacturers

Twin Coach Co. recently announced that it is offering its complete line of 90 to 250-hp engines for sale to all bus manufacturers. This step is a departure from former practices, as the company has previously built Fageol-Leyland engines for use in its own motor coaches. Available engines include units for operation on gasoline, propane, and Diesel fuel.

OPS Approves Adjustments in Chrysler Ceiling Prices

The Office of Price Stabilization has approved increases in retail factory list price ceilings for 1952 Chrysler Corp. cars ranging from approximately $64 for one Plymouth model to $235 for one Chrysler model. OPS had previously approved percentage increases ranging from 3.75 per cent for Chrysler cars to 5.12 per cent for the De Soto line.

The new ceilings for Plymouth, Dodge, and all Chrysler models, except the Saratoga series, indicate the full amount of percentage increases permitted. However, De Soto ceiling prices will be $24 to $39 less than those permitted. Approximate increases are: Plymouth—$69.65 or 4.14 per cent; Dodge—$85.43 or 4.36 per cent; De Soto—$88.71 or 4.02 per cent; Chrysler (six-cyl)—$91.71 or 3.78 per cent; and Chrysler (eight-cyl)—$145.34 or 4.77 per cent.



REO LPG ENGINE

The new Reo 331-cu-in., 142-hp Gold Comet engine for liquefied petroleum gas has been factory-designed and developed specifically for LPG truck applications. The company has stated that while it closely resembles its gasoline counterpart in the Gold Comet series, it is not a conversion unit. The engine, which has been installed in a new truck series and which is also offered as a replacement power plant for trucks of any make, has a compression ratio of 8.2 to 1.

Olds Offers Headlight Dimmer as Optional Item for 1952

Oldsmobile Div. of General Motors Corp. announced at the recent Chicago Automobile Show that an automatic headlight dimming device will be available as an optional accessory on its 1952 models. Called the "Autronic Eye," the unit operates by means of a prismatic condensing lens (mounted on the instrument panel), which acts an electric eye activated by the lights from an oncoming vehicle. When the approaching car reaches a predetermined distance at which highlights should be dimmed, the device automatically depresses the beam on the car in which it is installed. The headlights are returned to full high-beam when the approaching car has passed, provided no other car is approaching within range.

A foot control is provided so that the driver has the option of overruling the automatic dimmer to flip the headlights on high beam to signal an oncoming driver that his lights are on the bright beam. The price of the device as an optional item is said to be approximately $53 installed. According to reports, Cadillac Motor Car Div. will also have the unit available; it was developed and is produced by the Guide Lamp Div. of General Motors Corp.

AND AVIATION INDUSTRIES

GM, Chrysler Develop Gold Master Specimen Standards

A "gold standard" of surface finishes soon will be made available to all industries for improving quality control of machined parts, according to a recent joint announcement by General Motors Corp.'s Research Laboratories and Chrysler Corp.'s Engineering Div. The announcement marked the climax of a seven-year cooperative engineering project to perfect a universally applicable set of precision reference specimens of surface roughness on pure gold master blocks.

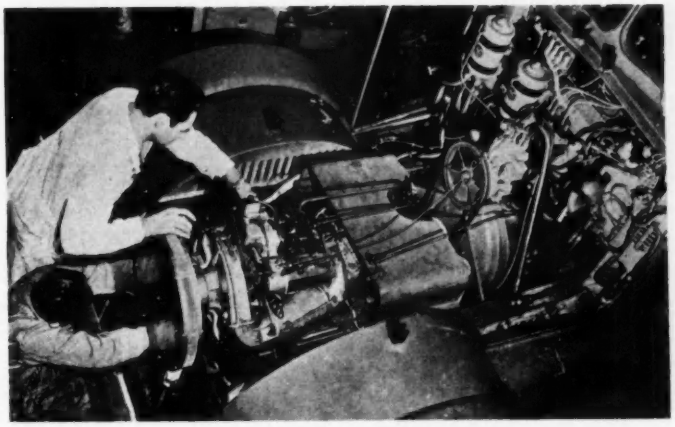
It is claimed that uniform precision in surface roughness measurement, accurate to one millionth of an in., will now be possible for the first time in factories, shops, and engineering laboratories throughout the nation. F. A. Ringler Co., 418 W. 25th St., New York 1, N. Y., will produce the "Caliblocks." This firm, along with its predecessor, U. S. Rubber Co.'s Electroforming Div., contributed an electroplating process which made possible accurate replicas of the gold master specimen standards developed by Chrysler and GM.

Negotiations are said to be under way with leading manufacturers of surface roughness measuring instruments to include reference specimens as calibrators. First replica blocks will be a combination of five so-called roughness values, the five most commonly used currently in machining of parts surfaces. Other values will be prepared later.

Chrysler Annual Report Indicates Tax Effects

Chrysler Corp's recently issued 27th annual report shows the far-reaching effects of taxes and other Government influences during 1951. Although passenger car and truck sales established another all-time high of 1,395,833 vehicles, which, along with all other products, aggregated a dollar sales volume of $2,546,678,799, net earnings for 1951, after federal taxes of $79 million, were only $71,973,469, compared with $127,876,791 in 1950.

Net earnings were 2.83 per cent of sales and, after excluding foreign dividends, were 2.68 per cent. These rates compare with 5.84 per cent and 5.28 per cent for 1950. Net earnings were $8.27 per share for 1951, as compared with $14.69 for 1950. The total of all taxes for 1951 was $239,859,709.



TRACTOR GAS TURBINE

The 175-hp Boeing gas turbine shown above powers a 16,000-lb Kenworth tractor, which has covered 15,000 miles of mountain roads carrying a 10,000-lb trailer and a cargo of 42,000 lb. Power is transmitted to the rear wheels through a shear-type flexible coupling made of rubber bonded to metal parts. The gas turbine is flexibly mounted for driver comfort and to protect it from excessive stresses. Both mounting system and drive couplings were recommended and produced by Lord Manufacturing Co.

Aircraft Employment Expands Appreciably

According to a survey made by the Bureau of Employment Security of the U. S. Dept. of Labor, employment in the aircraft and parts industry has doubled since Jan., 1950, and is expected to reach 625,000 by April. It showed that better than three out of every four plants contacted were experiencing difficulty in filling manpower needs. Out of 130 plants with aggregate employment in Oct. of 500,000, 100 were experiencing some trouble in obtaining the workers they needed. Some aircraft plants reported that shortages of engineers and key skilled workers were hampering production.

Chevrolet to Complete Aviation Facilities

Chevrolet Motor Div. of General Motors Corp. has announced that it will complete construction of its $30 million Aviation Div. facilities, Tonawanda, N. Y., despite a downward revision by the Government of its need for Wright aircraft engines. The Chevrolet contract for the piston-type engines, originally described as the largest defense job ever awarded the division, was cut, but substantially less than the 75 per cent originally reported. Therefore, it still will need a good portion of the facilities now being constructed for filling the revised contract.

McDonnell Aircraft Tools For Twin-Jet Fighter

McDonnell Aircraft Corp. has announced that it will tool up for production of a new twin-jet escort and penetration fighter plane under orders from the Air Force. Official designation of the model to be built has not been announced, but it is reported that it will be called the F-101 and will represent an improved version of the F-88, which has been under development by the Air Force. The experimental F-88 is powered by two Westinghouse J-34 engines and is said to be in the 700-mph class.

"Aviation" Dropped From AAPMA Name

Automotive and Aviation Parts Manufacturers Association has shortened its name to "Automotive Parts Manufacturers Association." No reason was given for the change, but many members felt that the previous name was unwieldy.

News of the AUTOMOTIVE

1951 NEW PASSENGER CAR REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1951 Twelve Months' Totals

MAKE	December 1951	November 1951	December 1950	TWELVE MONTHS Units 1951	Units 1950	Per Cent of Total 1951	Per Cent of Total 1950
Chevrolet	65,621	69,262	108,013	1,067,042	1,420,399	21.08	22.44
Ford	55,888	56,649	82,951	862,309	1,166,118	17.04	18.43
Plymouth	26,040	30,906	62,388	542,649	547,367	10.72	8.65
Buick	25,136	26,485	54,298	392,285	535,807	7.75	8.47
Pontiac	23,347	22,379	38,274	337,821	440,529	6.68	6.96
Dodge	17,103	20,483	33,262	298,803	300,104	5.90	4.74
Oldsmobile	17,187	18,097	36,829	273,472	372,519	5.40	5.89
Mercury	15,491	16,306	26,886	233,339	318,217	4.61	5.03
Studebaker	12,511	14,779	20,121	205,514	268,229	4.06	4.24
Chrysler	8,142	8,904	18,130	149,435	151,300	2.95	2.39
Nash	8,956	11,548	13,004	140,035	175,722	2.77	2.78
De Soto	7,906	8,140	14,627	112,643	115,023	2.23	1.82
Cadillac	6,551	7,057	7,436	97,093	101,825	1.92	1.61
Hudson	5,550	5,930	9,973	98,847	134,219	1.91	2.12
Packard	4,622	4,472	7,579	68,999	73,155	1.32	1.16
Kaiser	2,796	3,135	5,757	52,286	85,832	1.03	1.36
Henry J	2,494	3,011	4,516	51,372	14,339	1.02	.23
Willys	1,238	1,628	2,282	26,049	33,926	.51	.54
Lincoln	1,418	1,977	3,348	25,816	34,318	.51	.54
Crosley	248	310	501	5,304	6,896	.10	.11
Frazer			262		11,884		.19
British Austin	353	420	317	3,800	5,452	.08	.09
British Ford	267	279	192	3,508	1,869	.07	.03
Miscl. Domestic	185	312	379	3,162	2,375	.06	.04
Miscl. Foreign	1,025	1,148	832	13,520	9,015	.28	.14
Total—All Makes	310,084	332,099	552,259	5,060,903	6,326,438	100.00	100.00

* Based on data from R. L. Polk & Co.

GM Executive Outlines Jet Engine Progress of Future

At the Feb. meeting of the Detroit Section of the Society of Automotive Engineers, E. B. Newill, general manager of the Allison Div. of General Motors Corp., projected jet engine progress five years ahead by visualizing 50,000-hp power plants for two-man military aircraft. He stated that this degree of power was comparable to that of propulsion units used in fair-sized destroyers of prewar vintage.

Present Power

In spite of the fact that the jet age is very young, the speaker pointed out that some current engine designs have the equivalent of 27,000 hp and consume approximately two tons of air per minute, of which about 80 per cent is required to cool the machine. He went on to predict that higher output jet engines of the future will handle as many as five tons of air per minute.

Sizable Problems

The complexity of problems involved in the course of future development is apparent, for example, in the fact that laboratory facilities to test compressors alone require dynamometers of 35,000 hp. Also, wind tunnel facilities with installed capacities of 240,000 hp will be needed to simulate flight at high altitudes. A third problem demanding much study is that of the afterburner which, while it increases power output by some 30 per cent when properly designed and equipped, often burns twice as much fuel in the process, thus reducing range considerably.

Future Steps

Among the steps to be taken to increase the overall efficiency of jet engines, Mr. Newill visualized the employment of multi-stage compressors to boost compression ratio and thus increase thermal efficiency. This would result in the so-called "twin-spool" design, in which each stage of the compressor is driven independently from a corresponding stage of the turbine. Such an arrangement would give designers more flexibility in selecting compressor proportions, since the individual stages could be operated at more useful speeds.

He also proposed development of retractable screens at the air intake to aid in reducing air restriction under certain maneuvers and, in conjunction with suitable controls, to prevent icing. Finally, he urged that more attention be paid to the advantages of turboprop drive which, he stated, has greater fuel economy and range than jet engine drive, although top speeds are lower for the same-sized engine.

American Bantam Plant Reported on Market

According to a recent report, the American Bantam Car Co. plant, Butler, Pa., is being offered for sale or lease. The plant contains 330,000 sq ft of space and is located on a 15-acre site.

THE DOUGLAS XA3D ATTACK PLANE

The XA3D, a new type of attack plane built by Douglas Aircraft Corp. for the Navy, is awaiting forthcoming flight tests. The swept-wing carrier aircraft, an advancement on the AD Skyraider, is powered by two jets, each slung in a pod under the wing outboard of the fuselage. The plane is said to be in the 600 to 700-mph class.

AND AVIATION INDUSTRIES

INTERNATIONAL LPG TRUCK

The International L-205 truck is one of several models in which factory-built, liquefied-petroleum-gas-powered engines are now offered as optional equipment. The new LP-gas (propane-butane) engines may be installed in all International truck models powered by the company's Super Red Diamond engines. Large fuel tanks are said to permit trucks to operate up to 400 miles between refueling.

Studebaker 100th Anniversary Festivities Get Under Way

Studebaker Corp.'s 100th anniversary officially got under way with a centennial dinner at the University of Notre Dame at South Bend, Ind., Feb. 16, where the company was feted by 1000 civic leaders. Officers and directors of Studebaker were honored at the affair by a group of speakers headed by Paul G. Hoffman, formerly president of Studebaker and now director of the Ford Foundation. Also on the program were Walter P. Reuther, president of the UAW-CIO (the first time in history that a labor leader has participated in such a notable event in the automobile industry); Henry Schricker, Governor of Indiana, and John A. Scott, Mayor of South Bend.

The fourth largest manufacturer of automobiles, Studebaker has turned out 7,130,974 vehicles since the Studebaker Brothers opened a blacksmith and wagon shop Feb. 16, 1852, in South Bend, with capital consisting only of $68 and two sets of blacksmith tools. About 1900 the company was the largest manufacturer of wagons and carriages in the world. Manufacture of automobiles was begun in 1902 with an electric car.

H. S. Vance, Studebaker chairman and president, said that in the last five years Studebaker civilian business was equivalent to that of all the previous 95 years. He also stated that in the next three months the company's sales will approximate $100 million, or the equivalent of the company's total sales during the first 67 years of operation. He added that Studebaker will have its first billion-dollar year within the next five years. Today, Studebaker has $65 million in working capital, $50 million worth of plants, and approximately 20,000 employees.

Odlum Denies Negotiations for K-F and Consolidated Merger

In spite of persistent rumors to the contrary, Floyd Odlum, chairman of Consolidated Vultee Aircraft Corp., has flatly denied that negotiations have been on for a merger of his firm with Kaiser-Frazer Corp.

Champion to Pay Men Going into Service

Champion Spark Plug Co. has received approval from the Michigan Wage Stabilization Board to give 40 hours of vacation pay to employees of its Detroit plants upon entering the Armed Forces and one week's pay per year thereafter during the term of their original enlistment or induction. The benefit provision for workers called into service was one of several adjustments approved by WSB upon a joint petition filed by the company and union. They include a pay increase of from three to 10 cents per hour to correct interplant inequities, a wage differential of 7½ cents for afternoon and evening shifts, and increases in vacation pay.

1951 NEW TRUCK REGISTRATIONS

Arranged by Makes in Descending Order According to the 1951 Twelve Months' Totals

MAKE	December 1951	November 1951	December 1950	TWELVE MONTHS Units 1951	Units 1950	Per Cent of Total 1951	Per Cent of Total 1950
Chevrolet	20,806	25,219	27,720	350,344	414,495	34.90	36.28
Ford	19,138	19,027	24,140	250,802	315,912	24.98	27.66
Dodge	7,497	8,427	10,969	106,600	99,716	10.62	8.73
G. M. C.	6,061	7,605	9,069	100,285	97,200	9.99	8.51
International	5,589	6,099	5,894	95,184	97,818	9.48	8.56
Studebaker	2,180	2,901	3,205	32,675	45,881	3.25	4.02
Willys Truck	949	1,245	1,689	15,290	15,799	1.52	1.38
White	720	950	1,407	12,260	12,050	1.22	1.06
Mack	536	687	1,961	9,794	9,908	.98	.87
Willys Jeep	828	686	809	9,002	8,841	.90	.77
Diamond T	249	312	499	4,506	5,675	.45	.50
Divco	165	280	438	3,752	4,308	.37	.38
Reo	196	242	518	3,427	3,876	.34	.34
Brockway	103	146	250	2,182	2,384	.22	.21
Autocar	133	197	197	2,112	2,072	.21	.18
Federal	61	71	131	1,008	1,469	.10	.13
Pontiac	72	78	58	908	1,362	.09	.12
Kenworth	25	69	95	668	673	.07	.06
F. W. D.	38	45	34	501	323	.05	.03
Sterling	23	19	33	334	354	.03	.03
Peterbilt	11	32		301		.03	
Misc. Domestic	201	179	152	1,662	1,836	.17	.16
Misc. Foreign	14	22	15	251	353	.03	.03
Total—All Makes	62,596	76,517	89,273	1,003,850	1,142,307	100.00	100.00

* Based on data from R. L. Polk & Co.

News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Automobile Industry Cites Critical Metal Savings

Conservation measures and materials substitutions by automobile companies saved more than 60 million lb of critical copper and aluminum last year, according to a recent report of the Automobile Manufacturers Association. Savings this year are expected to be 31 million lb.

AMA also estimates that, due to conservation measures and cutbacks in production, the industry over the next two years will save nearly 300 million lb of copper, or enough to build seven million new automobiles. During the same period, aluminum savings will amount to about 100 million lb, or the equivalent of six million cars.

Lower production last year cut use of copper 90 million lb below the 1950 total, and it is estimated that this year copper consumption will be about 215 million lb under the 1950 level. AMA points out, however, that savings effected by the industry are not aiding automobile production, since the metal is being distributed to other industries or to defense work under Governmental orders.

Progress in Coach Development Marks Cleveland TCMA Show

Over 150 trailer coaches, in addition to numerous parts and other items of equipment, were exhibited at the recent 15th Annual Show of the Trailer Coach Manufacturers Association, in Cleveland, O. All of the coaches, which ranged from 19 ft to 50 ft in overall length, showed the creditable advances made in design, styling, and layout during recent years. It was interesting to note that the larger coaches are using tandem axles as standard equipment.

Chicago Auto Show Excels Once More in Exhibits and Visitors

Despite a labor dispute, which for a time threatened its opening, the Chicago Automobile Show, held Feb. 17 through 24, smashed all attendance records with an estimated 500,000 persons on hand. The labor difficulty stemmed from a picket line thrown up by the AFL Teamsters' Local 713 in an effort to force bargaining talks on organization of dealers' salesmen. Pickets were withdrawn the evening before the show opened after a settlement which involved only a promise that a group of dealers would discuss the matter with the union within 30 days. No commitments to bargain were made, however.

As usual, the Chicago Auto Trade Association spared no expense to insure that the show would remain the No. 1 automobile exposition in the country. The value of exhibits, stage setting, decorations, and production of the stage extravaganza "Motor Modes of 1952" was estimated at approximately $6 million. Nineteen makes of passenger cars and nine makes of trucks were on display, while 42 additional engineering, accessory, parts, equipment, and allied educational displays rounded out the list of exhibits. The automobile display included 55 different car models and 60 models of trucks. Largest single display was the Chrysler Corp.'s Engineering exhibit, which covered 12,700 sq ft of space, the largest in the history of the Chicago Show. Also on display were the Buick XP-300 and the Nash-Healey sports car.

International Nickel Announces Sound-Color Film on Corrosion

A new sound color film entitled "Corrosion in Action," prepared by the Corrosion Engineering Section of International Nickel Co., shows how corrosion works to cause an annual loss in industry and elsewhere estimated at over $6 billion. It also demonstrates how this damage can be avoided or controlled by various means, such as by the selection of corrosion-resistant materials, by the development of new alloys to meet given situations, by the use of electric currents to provide cathodic protection, and by other methods. The film will be available for showings in schools, colleges, industrial plants, and before technical society meetings after March 11.

Taxes and Controls Cut Nash Net 75 Per Cent

A supplier strike, Government controls of prices and credit, and materials restrictions made a deep slash in net earnings of Nash-Kelvinator Corp. for the first fiscal quarter of its current year ended Dec. 31, 1951. Net earnings dropped about 75 per cent to $1,034,024, compared with $5,081,101 in the same period a year ago. Sales for the quarter also showed a sizable decline, totaling $71,766,558, compared with $101,835,155.

(*Turn to page* 70, *please*)

REGIONAL SALES OF NEW PASSENGER CARS

Zone	Region	December 1951	November 1951	December 1950	Twelve Months 1951	Twelve Months 1950	Per Cent Change: Dec. over November	Dec. over Dec. 1950	Twelve Months 1951 over 1950
1	New England	15,057	17,701	24,091	285,565	347,679	−14.94	−37.50	−17.87
2	Middle Atlantic	59,050	62,416	100,359	967,383	1,188,015	− 5.40	−41.17	−18.58
3	South Atlantic	39,107	39,253	54,496	601,045	729,184	− .36	−28.25	−17.58
4	East North Central	71,050	80,089	171,393	1,291,496	1,567,854	−11.29	−58.55	−18.67
5	East South Central	16,867	18,241	25,080	240,562	313,984	− 7.54	−32.75	−23.39
6	West North Central	32,622	32,594	56,067	525,624	670,954	+ .08	−41.82	−21.67
7	West South Central	31,458	35,305	43,056	454,793	594,875	−10.90	−26.94	−22.25
8	Mountain	11,415	12,841	17,349	172,543	220,562	−11.11	−34.21	−21.78
9	Pacific	33,456	33,659	60,367	521,920	683,321	− .60	−44.58	−23.63
	Total—United States	310,084	332,099	552,259	5,060,903	6,326,438	− 6.63	−43.86	−20.01

States comprising the various regions are:—Zone 1; Conn., Me., Mass., N. H., R. I., Vt.—Zone 2; N. J., N. Y., Pa.—Zone 3; Del., D. of C., Fla., Ga., Md., N. C., S. C., Va., W. Va.—Zone 4; Ill., Ind., Mich., Ohio, Wisc.—Zone 5; Ala., Ky., Miss., Tenn.—Zone 6; Iowa, Kan., Minn., Mo., N. D., S. D.—Zone 7; Ark., La., Okla., Tex.—Zone 8; Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo.—Zone 9; Cal., Ore., Wash.

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers

Ford Motor Co., Metal Stamping Div. —Alton J. Hole has been appointed general manager.

Norton Co. Abrasive Div.—George A. Fyrberg has been named production manager.

Ford Motor Co.—**Richard E. Krafve** has been appointed executive assistant to **Benson Ford**, vice-president and general manager of the Lincoln-Mercury Div., and to **Stanley Ostrander**, L-M Div.'s operations manager. **John S. French** succeeds him as director of the Office of Defense Products.

Gardner Machine Co.—**C. W. Thompson** has been appointed vice-president and treasurer, while **R. E. Price** has been made assistant general manager.

Gar Wood Industries, Inc. — **Arthur F. Dries** has been named manager of sales promotion and advertising.

Ethyl Corp.—**Joseph A. Costello, B. Bynum Turner**, and **Sanford M. Wagner** have been elected to the board of directors.

American Brake Shoe Co., American Brakeblok Div.—**M. B. Terry** has been appointed executive vice-president.

Morrison Steel Products, Inc., Carry-All Div.—**John W. Hanlon** has been named sales manager.

Magnesium Co. of America—**Dennis E. Harvey** has been elected a vice-president, and **William Johansen** has been appointed general sales manager.

Caterpillar Tractor Co. — **George J. Wellner** has been elected assistant treasurer.

Goodyear Tire & Rubber Co., Western Div.—**D. W. Critchfield** has been named manager of aviation products.

Fansteel Metallurgical Corp., Rectifier-Capacitor Div.—**Glen Ramsey** has been appointed general manager, and **O. S. Aikman** has been made sales manager.

General Motors Corp., GMC Truck & Coach Div.—**Eric W. Hall** has been appointed coach advertising manager, succeeding **J. T. Feehan**, retired.

Precision Flexopress Corp.—**E. W. Forkner** has been named president; **Ben Kuresman**, executive vice president; and **T. Embury Jones**, secretary-treasurer.

E. W. Bliss Co.—**William Carlson** has ben chosen western Michigan sales representative.

Morton Machine Works—**Howard C. Carlson** has been made general office manager.

Borg-Warner Corp., Morse Chain Co. Div.—**Virgil P. Burgess** has been named controller and acting secretary-treasurer.

Doehler-Jarvis Corp.—**H. H. Doehler** has been elected honorary chairman; **L. A. Jarvis**, chairman; and **F. J. Koegler**, president.

Continental Screw Co.—**Dean B. Skillin** has joined the sales staff.

Detroit Harvester Co.—Bruce Morse has been appointed director of industrial relations.

Sundstrand Machine Tool Co., Pneumatic Div.—Robert N. Nelson has been promoted to sales manager.

Eaton Manufacturing Co., Spring Div.—**Michael C. Turkish** has been appointed chief engineer of the Coil Spring Dept.

(*Turn to page 75, please*)

Necrology

Burl A. Dollens, 50, vice president and general manager of the Electro-Motive Div., General Motors Corp., died Feb. 9, in Chicago, Ill.

Phil Huber, 62, chairman of Ex-Cell-O Corp., president of Michigan Chrome & Chemical Co., and a director of Mid-West Abrasive Co., died Feb. 8, in Detroit, Mich.

Charles E. Johnson, 76, president of Sealed Power Corp., died Feb. 13, in Muskegon, Mich.

Harry Frank, 71, treasurer and director of Detroit Aluminum and Brass Corp., died Feb. 11, in Ann Arbor, Mich.

Morris E. Leeds, 82, chairman of Leeds & Northrup Co., died Feb. 8, in Lake Wales, Fla.

Otis L. Smith, president of Weldit, Inc., died Jan. 28, in Detroit, Mich.

Leo W. Troy, 50, assistant production manager, Rochester Products Div., General Motors Corp., died recently, in Rochester, N. Y.

Louis F. Rodewig, 51, assistant manager, Industrial Div., General Electric Co., died Feb. 7, in New York, N. Y.

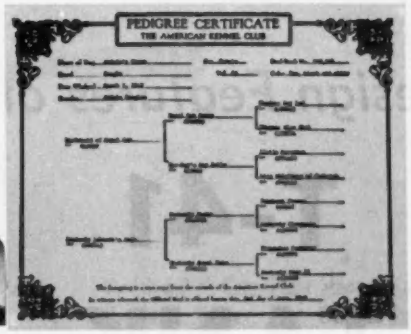
Joseph R. Williams, 57, product manager of pavers and portable mixers, Worthington Pump and Machinery Corp., died Feb. 1. in Plainfield, N. J.

Marcel H. Tisne, former accessory sales manager of A. Schrader's Son, died Feb. 4, in Florida.

William E. Boyer, 77, one of Henry Ford's early assistants in the development of the Ford car, died Feb. 14, in Cleveland, O.

THE NEW BRITAIN MACHINE COMPANY
N.B.
Greater Productivity
AUTOMATIC BAR AND CHUCKING MACHINES · PRECISION BORING MACHINES
LUCAS HORIZONTAL BORING DRILLING AND MILLING MACHINES
NEW BRITAIN
Automatics
THE NEW BRITAIN-GRIDLEY MACHINE DIVISION
THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN, CONNECTICUT

THE BEAGLE is always ready for the hunt. He is accustomed to hunting in a pack and when in action waves his tail gaily and obeys all commands quickly and cheerfully. Beagles should stand no higher than 15 inches.



In Boxes, too

The Pedigree is Assurance of Thoroughbred Stock

A "PEDIGREED BOX" results from integrated production, with quality control by one management from timber to finished box.

That's why American Sugar Refining Company uses Union boxes to provide safe packaging for Domino sugar from refinery to dealers' shelves.

75 years of undisputed leadership in paper packaging goes into Union boxes. Tremendous forest resources feed five of the largest paper machines in the world, in a completely integrated pulp-to-container plant unmatched in America for size and production. And four modern box plants, strategically located, serve you promptly and dependably.

Add all these *extra* assurances of consistent quality, dependable service and fair price and it's easy to see why every month more makers of national brand products are shipping in Union boxes.

UNION BAG & PAPER CORPORATION
CERTIFICATE OF BOX MAKER
THIS BOX CONFORMS TO ALL CONSTRUCTION REQUIREMENTS OF CONSOLIDATED FREIGHT CLASSIFICATION
BURSTING TEST 200 LBS. PER SQ. INCH
SIZE LIMIT 75 INCHES
GROSS WT. LT. 65 LBS.
GA.
Domino
Cane Sugar
Old Fashioned Brown

TRADE MARK UNION

Dependable Packaging Since 1872

UNION Corrugated Containers

UNION BAG & Paper Corporation

Principal Offices: WOOLWORTH BLDG., NEW YORK 7, N. Y.

***Corrugated Container Plants:* SAVANNAH, GEORGIA • CHICAGO, ILLINOIS • TRENTON, NEW JERSEY**

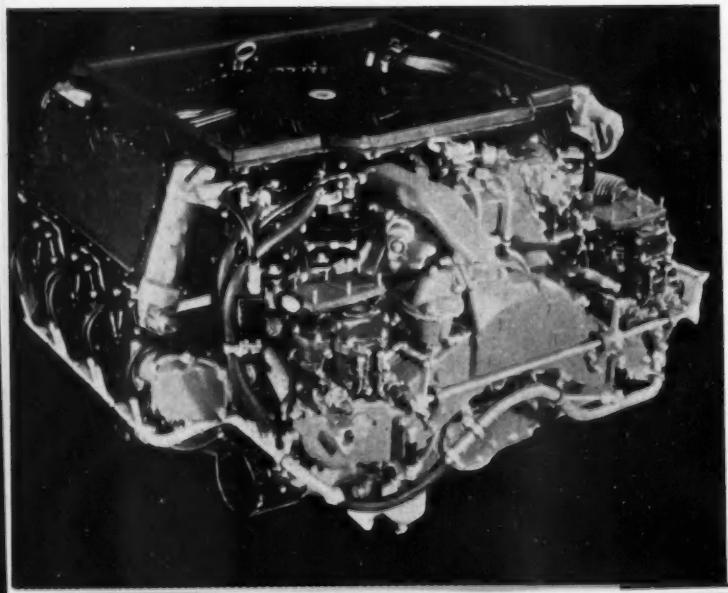
Design Features of

T-41 TANK

IMMEDIATELY after V-J Day, while industry was clearing its plants of Government tools and worrying about getting back into commercial production, the Ordnance Corps started a combat vehicle development program based on the lessons learned during the war. Early in 1948, representatives of industry were invited to attend the Ordnance Industrial Mobilization meeting held at the Detroit Arsenal. During this meeting, the new Ordnance tank and automotive programs were outlined, along with a display of many new tanks and components to replace World War II equipment. The theme of the meeting was design simplification, ease of maintenance through better accessibility, and greater interchangeability of major components between the various vehicles. In addition, the new vehicles were designed to provide greater armor protection, added fire power and increased mobility.

Ordnance was interested in the reaction of industry to the new program and further, they were also interested to know how long it would take industry to place these new vehicles in production if this became a requirement. Inasmuch as Cadillac was the vehicle design agency, and the principal producer of light combat vehicles during World War II, they were requested to make a Phase I Study for the mobilization planning of the new light tank. This study was completed and submitted to Ordnance.

Fig. 1—Aircooled Continental engine which powers the tank.



This study included tool estimate sheets on each part or assembly and a determination of machines and/or equipment required. Manufacturing specifications were made on each part or assembly and Detroit Arsenal, Development and Engineering, was requested to make changes on components to facilitate manufacturing. Field tests were observed and recommendations made.

Before the Partial Phase II Study was completed, Ordnance requested Cadillac to consider producing a quantity of the new Ordnance Light Tank, T41-E1. Commercial business was running at a very high level and facilities were completely occupied so it was necessary that an entirely new setup be developed for this assignment as there was no immediate indication of a retarded commercial production.

By Edward N. Cole, Plant Manager, and Harold G. Warner, Asst. General Supt.

Cadillac Tank Plant, Cadillac Motor Div., General Motors Corp., Cleveland, Ohio.

At this point, however, Cadillac started to review the Ordnance designs and to make recommendations for changes to improve the tank, and to facilitate manufacture. An engineering organization with about 15 engineers was established to handle tank work exclusively. For a short time the group remained in Detroit inasmuch as the facility for the production of the vehicle had not yet been determined. However, it was established that the engineering staff would be moved to the production facility and the group expanded. Now, there are over 500 engineers and supporting personnel in the tank engineering division.

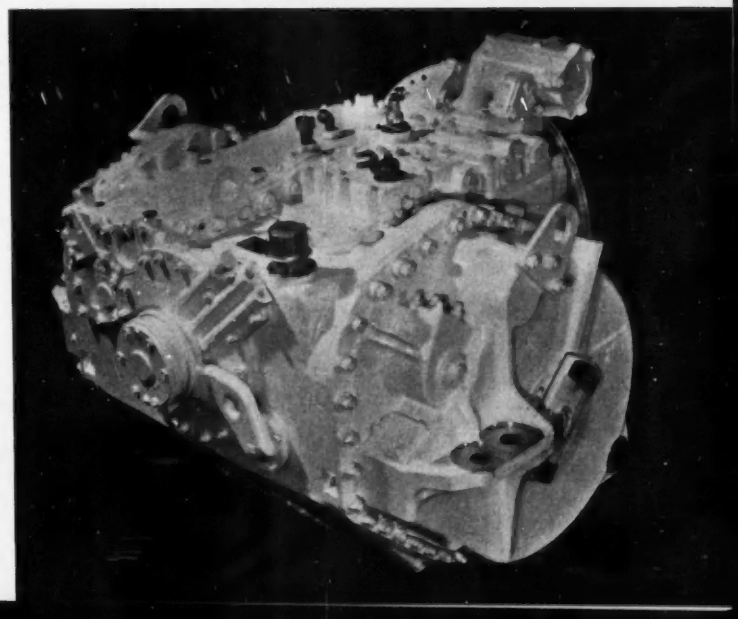
A Machine Tool Engineering Division was also established and followed an expansion pattern which was very similar to the product engineering group. As soon as basic design information was received from Ordnance Engineering, the product and tool engineers reviewed the designs to determine the changes that should be made to permit the use of equipment that was likely to be commercially available.

Early in our discussion with the Ordnance Corps, it was believed desirable to equip the new facility with those machines and tools that were peculiar to the production of combat vehicles and not in general use by commercial industry. Also, the components that could be readily produced by commercial industry would be subcontracted to reduce the number of new machines and tools required. This policy made it possible to establish a make-or-buy list and to immediately order the general purpose machines and tools that would be required for the new plant.

During the postwar period, Ordnance engaged in a program with industry to develop a new series of major components for combat vehicles. The Continental Motors Corp. had done considerable work with the Ordnance Corps on the development of a new series of aircooled engines. Ordnance decided that the engine to be used in the new Walker Bulldog Tank would be produced by Continental.

Also, the Allison Division of General Motors had engaged in a similar development program for a new series of transmissions for combat vehicles and one of these was to be used in the new tank. Ordnance also

Fig. 2—Exterior view of the cross-drive type transmission.



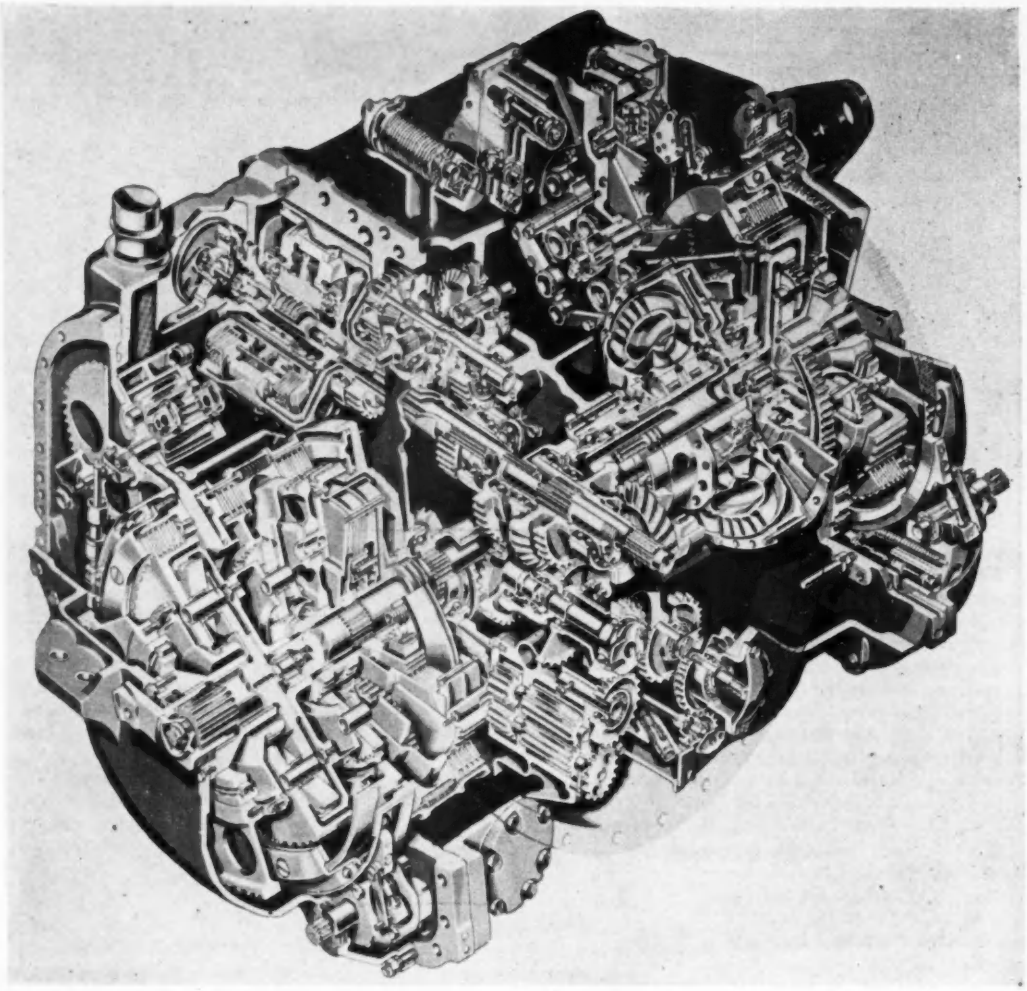


Fig. 3—Cutaway view of the transmission. This unit is made by the Allison Division of General Motors.

has done development work with other manufacturers on components such as the auxiliary power plant and electrical units that were planned for standardization. Therefore, in many cases, the facilities for those items were already determined. This advance work by Ordnance greatly simplified the overall procurement problem; however, there were nearly 8000 parts still to be procured or manufactured.

Machines and tools were in short supply and deliveries on special machines were months away. Furthermore, Ordnance had a large number of machines in reserve and it would be necessary to exhaust this supply before any new machines could be ordered. From the basic list of machines that had been developed, the Ordnance machine reserve was reviewed and in a short time the list of machines that could be made available from reserve was determined.

In addition to the Ordnance reserve machinery, the used machinery market was explored and many machines were found available from this source which would be difficult to obtain new, and on which long time delivery dates were estimated. Then, orders were placed immediately for the new machines which were required. However, before machinery orders could be placed for the special purpose equipment, it was necessary that the product, and machine and tool engineers finalize the design of the components requiring these machines. It is difficult to readily freeze complicated

designs without taking time for development and test and this was true of many of the components in this vehicle. However, in order to come close to meeting the established schedule, it was necessary to partially commit for the special machines and to follow with complete details as soon as the designs were released.

It was this decision to start advance commitments on machines that helped most in advancing the program. All this work had been done and still it had not been determined where the new T41-E1 tank was to be built except that it would be in some facility to be designated by the Government.

Coming to details of the design of the new Walker Bulldog Tank and the military characteristics of this vehicle, the following are some of its features. It weighs approximately 52,000 lb and has excellent fire power, mobility and armor protection as compared to the World War II light tank. It is equipped with a new 76 mm high velocity gun which is two ft longer than the 90 mm gun used on the World War II medium tank. The gun is equipped with an evacuator mechanism which permits discharge of up to 200 consecutive rounds without excessive accumulation of fumes in the fighting compartment. It is equipped with a muzzle brake which lessens the recoil force. The T41-E1 is powered by a horizontally opposed, aircooled six cylinder supercharged Continental engine.

It will be noted in Fig. 1 that the fan is mounted on top of the engine and provides cooling air for the head and cylinders as well as for the oil heat exchangers that cool both the engine and transmission oil. The engine is completely waterproofed and can be operated fully submerged.

Figure 2 shows the transmission which is the cross-drive type using a torque converter for coupling to the engine. It has two forward speeds and was developed as a part of the Ordnance program for standardization of components, and is produced by the Allison Division of General Motors.

Figure 3 is a cutaway view of the transmission which will permit a study of the power flow from the engine to the output shafts. This transmission provides the necessary gear ratios to permit the tank to have the required tractive ability as well as a top speed of 40 mph. It also has provisions for braking and steering. One of the unusual features is the ability to pivot steer the vehicle within its own length. The engine and transmission when coupled together make a compact unit which can be readily removed for service or replacement.

The auxiliary power plant or "Little Joe," produced by the Detroit Diesel Engine Division of General Motors, is used to supply the electrical energy when the main engine is not operating (see Fig. 4). It also is designed to provide warm air to heat the main engine compartment for winterization purposes. It can be readily started at extremely low temperatures without winterization aids. Fig. 5 is a cross section of "Little Joe" and shows how the generator armature is directly coupled to the crankshaft. (*Turn, please*)

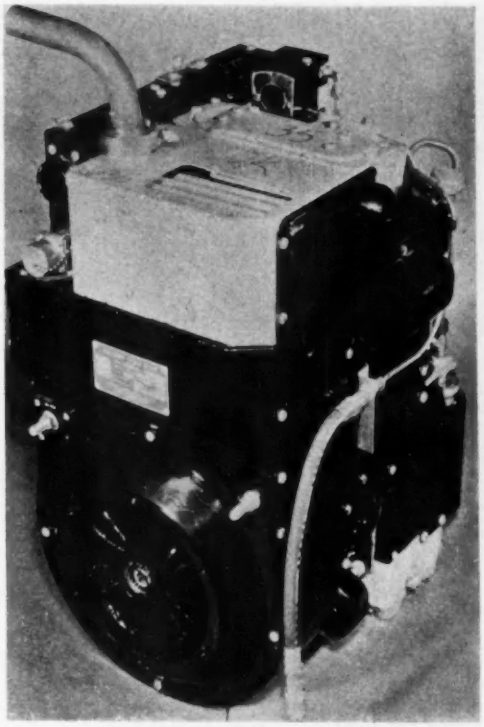
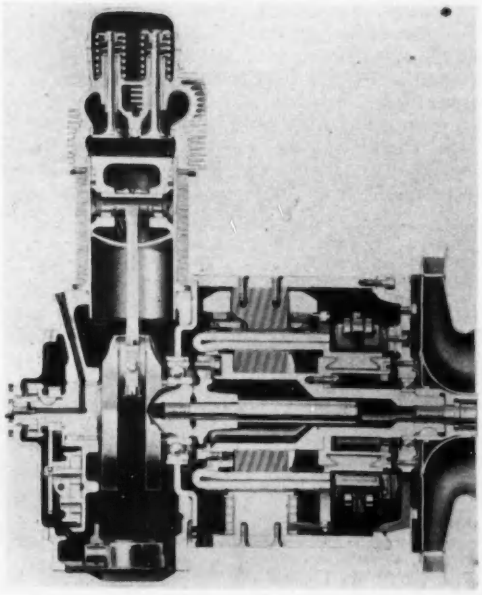


Fig. 4—Auxiliary power plant which is used to supply power when the main engine is not in operation.

Fig. 5—Sectional view of the auxiliary engine and generator.



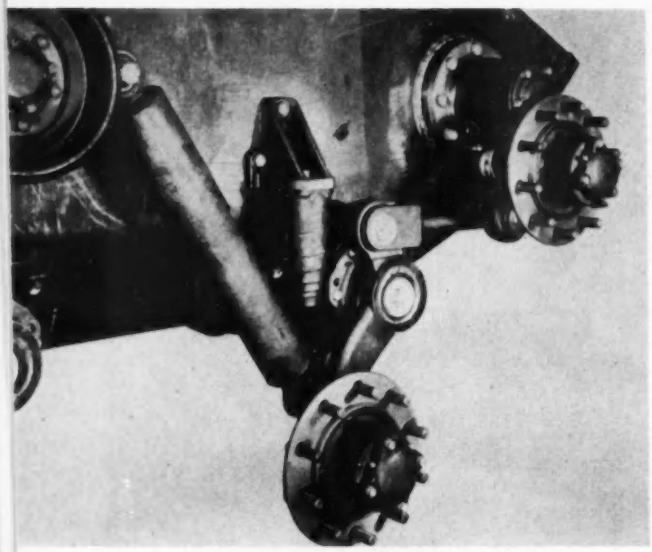
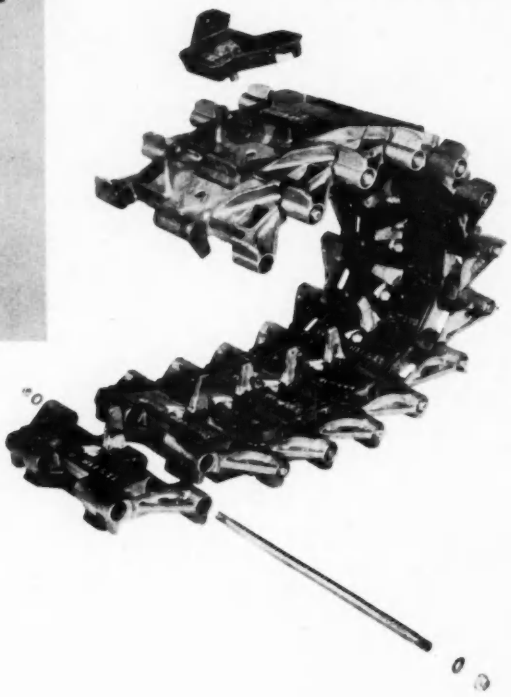


Fig. 6—Suspension compensating mechanism.

Fig. 7—Section of new single-pin track.



The electrical system used in this vehicle is a 24 volt with junction boxes and all components completely waterproofed. The connections between the various electrical units and cables are made through quick disconnect waterproofed couplings. Extra precautions have been taken in the electrical installation to provide adequate suppression for the communications equipment.

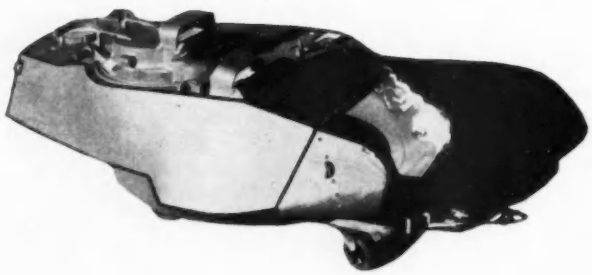
All suspension units are protected by new face type seals which resist abrasion and dirt, and retain a light oil for lubricating the bearings and rotating parts. By using light oil, the suspension is completely winterized for Arctic operation when it leaves the assembly line.

The suspension compensating mechanism which keeps the track tension nearly constant with vertical front wheel motion is illustrated in Fig. 6. The idler wheel support is linked to the front suspension arm in a manner that pushes the idler wheel forward when the front suspension wheel is raised. This feature keeps the track under fairly constant tension and has gone a long way towards eliminating track throwing. Note the attachment of the hydraulic shock absorber to the front arm. Sheck absorbers are used in the two front positions and at the rear, but not in the center because little pitch damping can be obtained from shock absorbers located at these points.

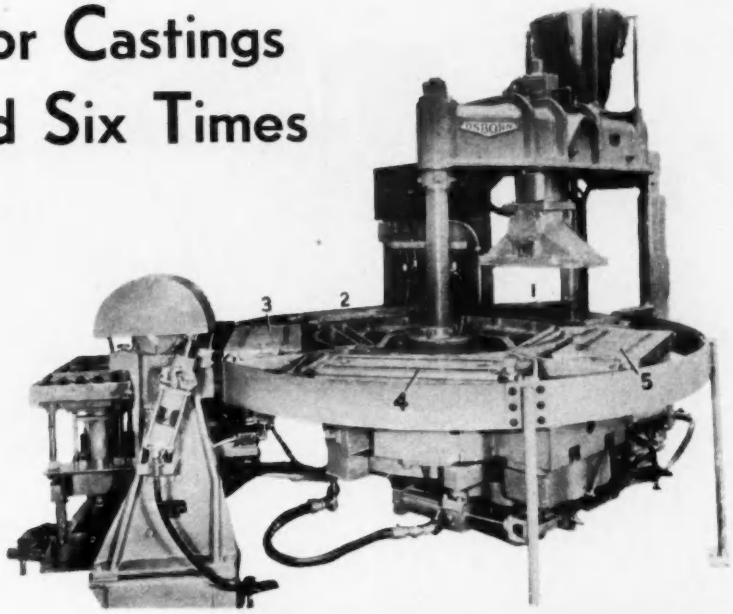
The new single pin track developed for this tank is shown in Fig. 7. Early in the program, a double pin track was tested which was heavier and could be thrown easily from the vehicle during normal maneuvers. It was determined that this particular track had considerable longitudinal stretch and was not as stable as desired laterally.

(*Turn to page* 55, *please*)

Fig. 8—This illustration shows the employment of formed rolled armor for the turret.



Cores for Castings Increased Six Times



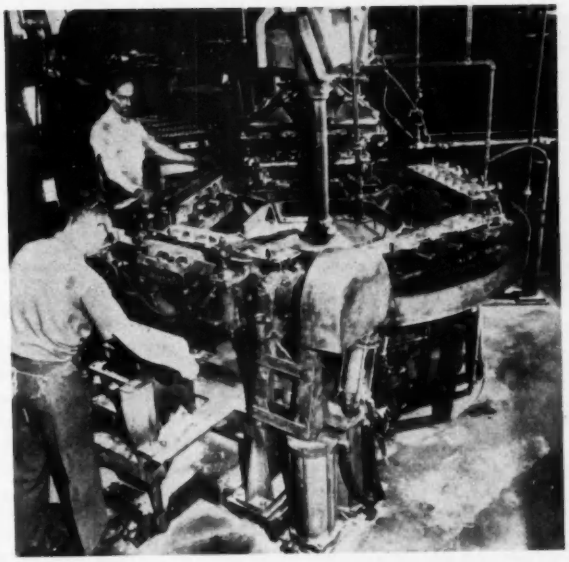
The new machine combines all of the jobs in core making. Station 1 is the core blower, at Station 2 the worker places the dryer plate on the finished core, Station 3 is the rollover draw where the core is taken from the core box and placed on the conveyor, another core box is prepared at Station 4, and at Station 5 other work is done to prepare the core box.

PRODUCTION of six times the former rate is said to be achieved in the making of cores for castings by employing a new automatic method developed by the Osborn Manufacturing Co., Cleveland. This new method utilizes the Roto-Core Automatic, a machine designed and manufactured by the company's machine division.

The equipment combines a mechanism for blowing the core or driving prepared sand into conventional core boxes; a five-station turntable interlocked with the core blower which brings empty core boxes to the core blower for filling and which takes away the filled boxes; and a core rollover and core drawing mechanism which serves to extract the cores from the filled boxes onto dryer plates ready for processing.

Under the old system of making cores for automotive castings, a three-man team was needed to produce 90 cores per hour, or a production rate of 30 cores per man-hour. The new Osborn method can turn out 360 jacket cores an hour with a two-man team, a production rate of 180 cores per man-hour. In addition to this increase in production, this new machine is said to make cores that are more accurate and of higher quality than the old method.

The machine consists of a turntable with five stations: one for the blow; one where the worker places the dryer plate on the finished core; the rollover, where the core is taken from the core box and placed on a conveyor; another where the core box is blown and sprayed; and the (*Turn to page* 64, *please*)



First Installation at Buick. The Buick Division of General Motors is using this Osborn automatic core making machine to produce cores for the intake manifold, block water jacket and spring housing for the cylinder block. Several accessories aded by Buick to the core box equipment have speeded up production from original estimated 240 cores per hour to over 300 per hour.

Fig. 2—One of Bendix' test vehicles with temperature recorder mounted on truck chasis.

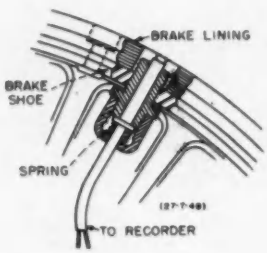


Fig. 1—This cross section of the special thermocouple shows the method of mounting in the brake assembly.

Testing Brakes Severe Operating

ALTHOUGH such factors as loads, maximum allowable braking area, and speeds are taken into consideration when designing brakes at the Bendix Products Division, Bendix Aviation Corp. at South Bend, Ind., tests on the laboratory dynamometer and on test trucks must be passed before the design is finalized.

During tests on the laboratory dynamometer, an ElectroniK strip chart instrument continuously measures and records critical temperatures. At this stage it is frequently possible to detect minor errors in design which show up during simulated working conditions. However, experience has proved that a brake which has passed the dynamometer test may not perform in exactly the same manner under actual field conditions.

In order to determine just how a set of brakes will perform under the worst possible conditions, they are installed on a truck which is then loaded to its maximum capacity and sent to some mountainous territory for a series of tests.

Before going on a test run, each truck in the fleet of test vehicles operating out of the Bendix plant is loaded with iron weights so that it will be operating under the severest service conditions. Because of the level terrain surrounding South Bend, the test trucks frequently travel to the mountainous

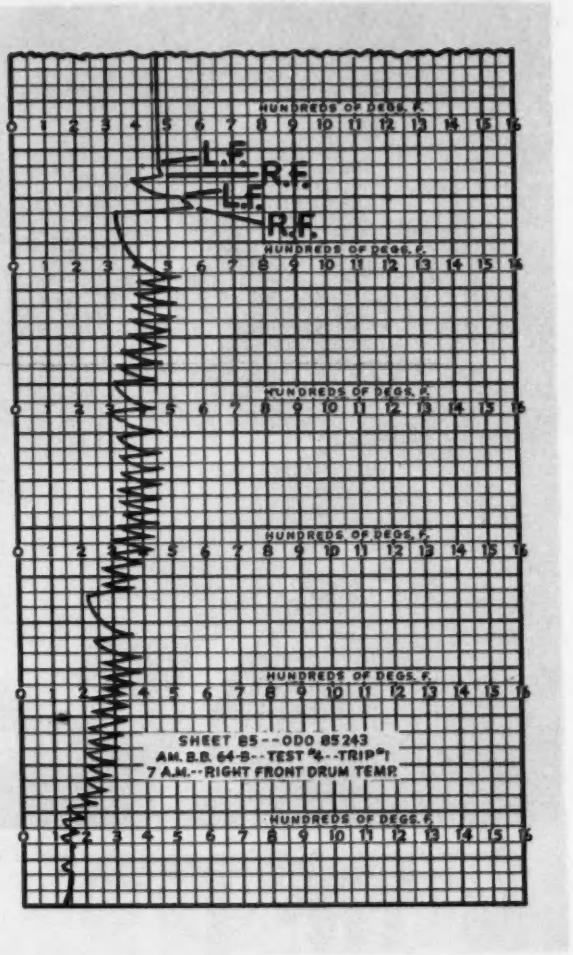


Fig. 3—Illustration at right is a section of chart record made during a test run. The record shows the increase in brake temperatures during repeated brake applications. Horizontal figures 0 to 16 indicate hundreds of deg. F.

By R. E. Dix and W. D. Farrington

Bendix Products Division, Bendix Aviation Corp.

Under Conditions

regions of Pennsylvania. A typical test may comprise a three-mile run down a mountain road with the truck in the first gear below direct drive which is normal procedure for driving trucks down steep grades. During this test run, the driver makes a series of so-called snub stops, during each of which the speed of the vehicle is reduced from 22 to 17 mph.

The test trucks are in themselves mobile laboratories, as they carry with them instruments that measure the variables of interest to the brake designer. For example, mounted inside the cab are: a gage which indicates the applying pressure developed in the brake system; a decelerometer that shows rate of deceleration; a dial, actuated by a linkage connected to the brake pedal, that shows the amount of brake pedal travel; an application counter, actuated by a solenoid wired into the stop light circuit, that shows the number of times the brakes were applied; and a gage that shows the distance required to bring the truck to a stop. This gage is also actuated by a solenoid wired into the stop light circuit and, when in use, goes into operation as soon as the brakes are applied.

There are then available means for measuring power input to the braking system (system braking pressure), as well as the output of the braking system (rate of deceleration). However, even with the data supplied by these instruments, the designer has no means of checking on the adequacy of his design. By measuring the temperature of the brake drums while the tests are being run, however, the necessary design data can be obtained.

Since the temperature of the brake drum proper was wanted, the first job was to design a special thermocouple that would be in contact with the drum during brake applications. The resulting iron-constantan thermocouple assembly, about ¼ in. diam and

(Turn to page 59, please)

Outmoded equipment in the old Dodge main powerhouse went to aid Chrysler's scrap campaign.

Huge die shown here was once used to make automobile body parts. It was scrapped as

Scrap Drive

SMALLER companies must contribute more to scrap program as point of diminishing returns has been reached in large plants.

COLLECTIONS of scrap fall off during the winter and a combination of a serious scrap shortage, together with one of the worst winters in many years, has resulted in a grave situation for steel mills in regard to scrap supplies. Severe winter weather during the early part of January slowed down the movement of iron and steel scrap, and resulted in the shutdown of eight openhearth furnaces in the Pittsburgh area. Favorable weather and special allocations of scrap made it possible to restore them to production during late January and early February.

It is now becoming apparent that more and more of the burden of collecting dormant scrap will have to be taken up by smaller companies on a much wider scale than heretofore practiced. The reason is that the automotive industries and other large manufacturers have been engaged in the dormant scrap program for many months and finally have reached the point of diminishing returns. Some of the automotive firms started their scrap programs as early as last May and reached their peak in the fall months. Others started in July or August and turned in their largest amounts of scrap towards the end of the year. However, the kind of intensive program of scrap collection carried on by these companies cannot continue to yield large results indefinitely. The nature of the scrap collected is in the form of obsolete tools, dies, jigs, and parts no longer needed for service and, in many cases, structural steel. Obviously such a program can produce results for a while, but inevitably when plants have been thoroughly combed, such scrap dwindles because it is not being replenished except at a very low rate.

Through January, the automotive industry had collected and sent to mills more than 87,500 tons of dormant scrap, and although the program is continuing vigorously, the rate is declining. The total includes not only scrap recovered from the company's own plants but also equipment and parts stored in suppliers' plants and contributions by automobile dealers who are cooperating in the drive. An indication of

part of an operation totalling more than 1000 tons.

This hammer base, a relic of earlier manufacturing processes in a Chrysler Corp. plant, added 80,000 lb to the scrap drive.

Has Passed Peak in Automobile Industry

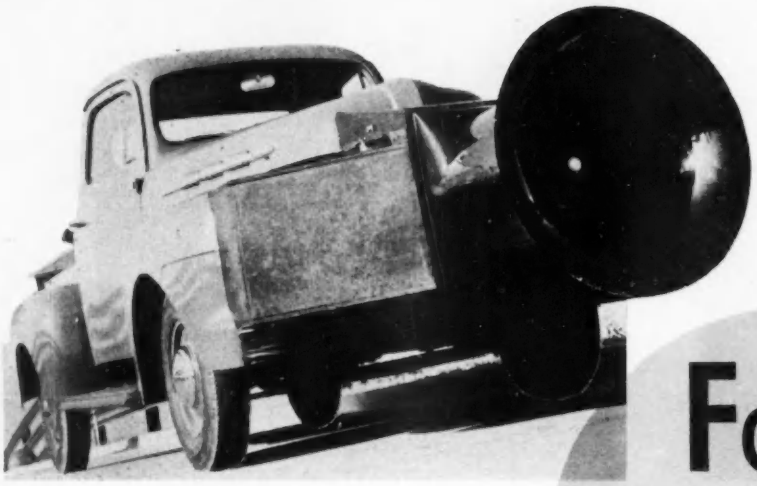
By Leonard Westrate

Right, shows sheet metal trimmed from body parts, etc., pressed into bundles for easier handling.

how important the dealer contribution can be is shown by a report from Oldsmobile that its dealers have collected more than 5500 tons of scrap iron and steel. Dealer contributions included scrap metal, old and worn out automobiles, obsolete equipment, and machinery. The dealers also helped to organize school children, Boy and Girl Scout groups, and 4H Clubs in the scrap drive.

The scrap shortage has its roots in several factors—the two principal ones being the declining production, under Government order, of civilian goods which generate considerable amount of scrap in their manufacture, and the undetermined but evidently substantial amounts of unprocessed steel going into military inventories for future use. In addition, total steel production is going up year by year, resulting in greater demands for scrap for melting purposes.

(*Turn to page* 60, *please*)



A detachable snout of plywood and metal is used to supplement indoor wind tunnel tests. Attached to a Model F-1 Ford truck, it helps in checking fan and radiator performance, and air flow at the test track in Dearborn.

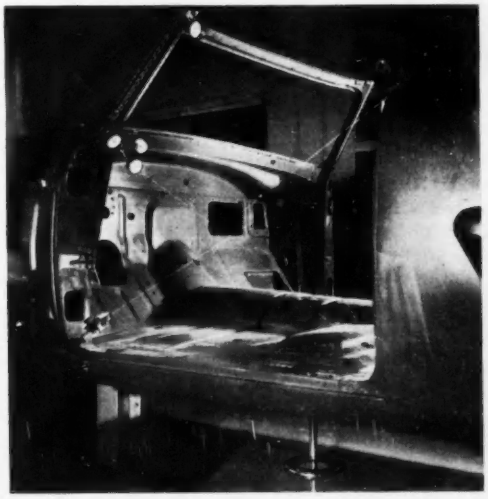
FORD'S ENGINEERING FACILITIES

Heavy-duty jigs are moved into place for welding operations on a pilot model Lincoln body. Kirksite dies are used for production of body panels for full-size pilot models, thus eliminating the slower hammer-formed method.

Special machine, below, measures endurance of metal proposed for use in making springs. After they have been forged to form and heat treated, the specimens are subjected to constant flexing until they fail. The machine tests six specimens at the same time.

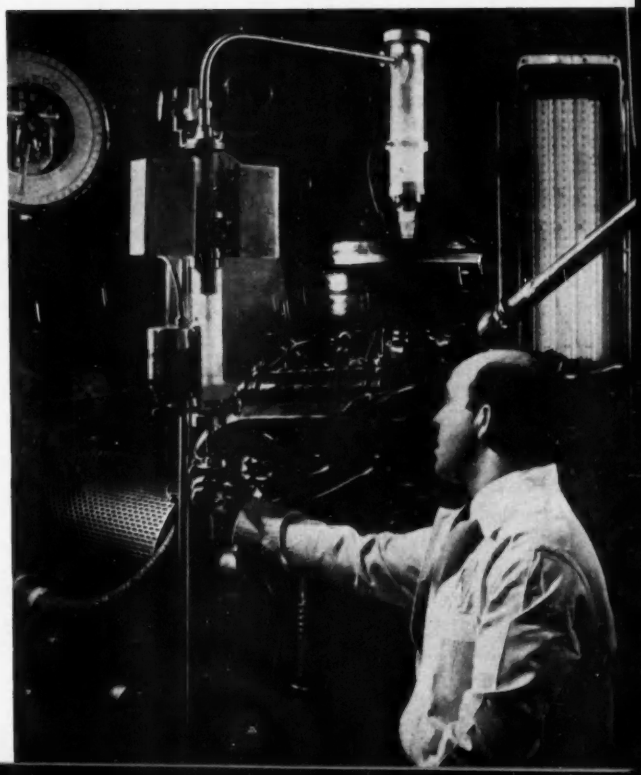
SHOWN here are some selected views taken at Ford's new research and engineering center in Dearborn, Mich. The first step in the development of this $50 million facility has been completed with the erection of the dynamometer building, first of six major units in the program. A description of this new Ford project appeared in the February 1 issue of AUTOMOTIVE INDUSTRIES page 18.

Electronic recording devices are used to determine the best materials for sound dampening. The plate used is a heavy piece of cold rolled steel 20 by 20 in., specially ground. Test results with the vibrating plate are used to establish specifications for sound and vibration dampeners.



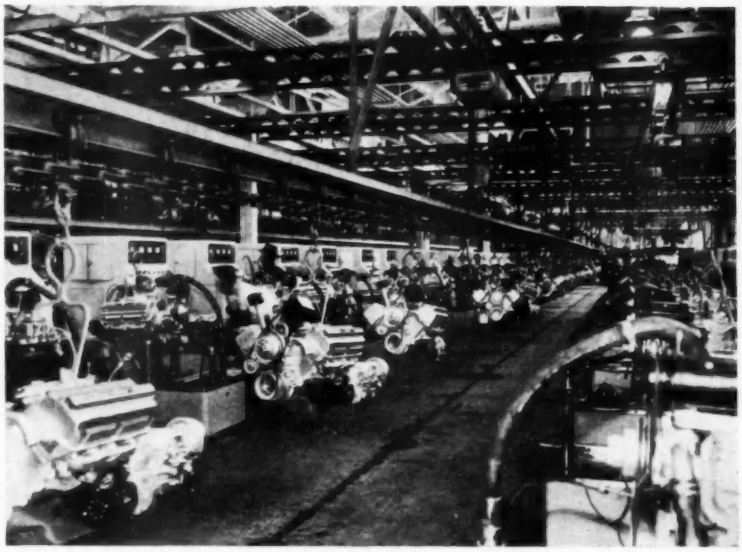
Body and frame visual twist tests are made with this setup in the Body and Structures laboratory. As illustrated, dial indicators are arranged to show amount of twist at various parts of the body structure when it is put under strain.

Dust particles are sorted and graded by size at the laboratory to duplicate those found on farms and in dry areas of the country. As shown in this illustration, dust is fed into an engine air cleaner to test its efficiency.6 Dust concentration is 0.025 grams per cu ft of air for this test.



Unique Handling of Chips and

By
Joseph
Geschelin



Perspective of engine block test department with the parallel rows of automatic cycle test stands. The monorail conveyor traverses this department along the center aisle, transporting engines for testing.

ALTHOUGH the character of the new engine plant of De Soto Division, Chrysler Corp., naturally is centered about its outstanding machine lines, below the surface—literally—is an amazing network of service facilities for automatic chip disposal, and centralized distribution of cutting fluids and coolants. In addition there is an excellent materials handling system both underground and overhead.

THIS is the Second in a Series of Articles Describing De Soto's New Engine Plant. The First, which Appeared in the December 15 Issue of AUTOMOTIVE INDUSTRIES, Was Devoted Principally to Special Machines for Operations on Engine Parts Such as Cylinder Blocks, Heads and Crankshafts. The Present Article Discusses an Unusual Setup for Chip Disposal and for Centralized Distribution of Coolants and Cutting Fluids. A Third Article Will Be Published in a Forthcoming Issue of AUTOMOTIVE INDUSTRIES.

In the initial development of these services there was a meeting of minds on the part of management, master mechanic and tool engineers, and plant engineering aimed at creating an operation that would emphasize good housekeeping without much janitor service and the minimum of maintenance cost. One of the controlling factors requiring initial decision was the matter of cutting fluids practice. Considering the variety of machining operations as well as the variety of metals to be cut—cast iron, steel, and aluminum—this group had to decide what cutting fluids to employ and how far simplification of practice could go.

Of interest to all metalworking plants in this industry is that De Soto decided to use just one basic cutting fluid—a soluble oil—for all operations except honing. Moreover, they finally agreed on just two mixture strengths—25 to 1 for all turning; and 75 to 1 for all grinding operations. This decision laid the groundwork for the centralized coolant system.

The significance of this move may be better appreciated when it is considered that metal cutting operations include—drilling and tapping, milling, surface

Cutting Fluids

at De Soto's Engine Plant

Here is the chip discharge end of the Delpark filter in the aluminum area. It will be noted that the filter paper is unloaded continuously into the skid box, carrying with it the accumulation of chips. The coolant, on the other hand, filters through the paper and finds its way into the tank.

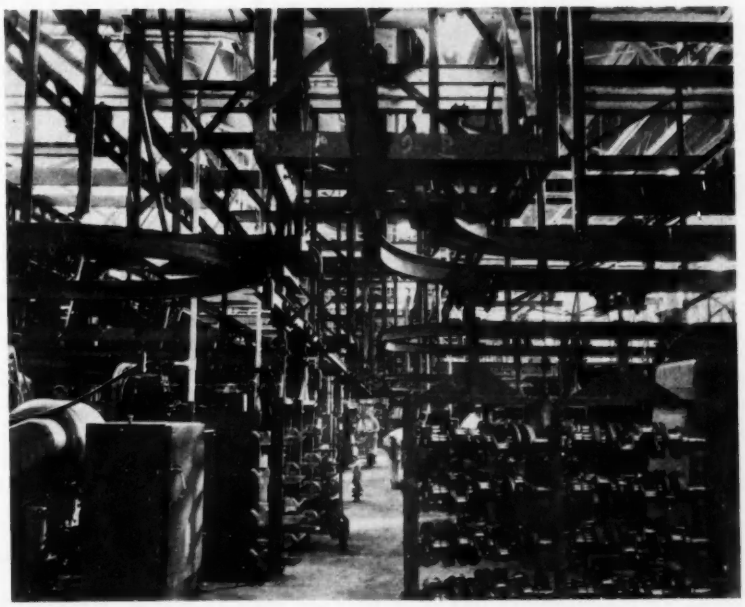
broaching, boring, surface and external and centerless grinding, gear cutting, and precision boring.

In the layout of the plant all cast iron operations—blocks, heads, manifolds, oil pumps, chain case covers, etc.—are concentrated in one large area separated from steel cutting by a wall. Since practically all cast iron operations are done dry, this department is served by a system of under-floor trenches into which are dumped the chips from individual machines. Actually there is a network of five trenches traversing the machine bays, connected to a single trench at the rear. The dry chips drop onto chip conveyors in the trenches and at the end of the department the chips are elevated and transported to a large hopper. At this point the hopper discharges the load onto gondola cars for disposal as scrap.

Dry machining, however, poses the problem of dust and dirt, certainly not conducive either to good housekeeping or worker comfort. Consequently, this area has been equipped with an R. C. Mahon 160,000 cfm ventilating system, filters, and dust collectors. The equipment, as installed, consists of two separate units. Dust and fine chips are picked up continuously through ducts, discharged through skimmers which take out the larger particles, then deposited in dust hoppers. The accumulation in the hoppers is then permitted to drop down to the chip conveyors in the trenches, thus discharging the larger particles into the cast iron chip stream.

The cast iron department, on the other hand, also handles the

Network of overhead rails in the crankshaft department. As shown, the crankshafts are held four to a carrier, pushed by hand from one machine to another.



Condensed Information on Conveyor Lines De Soto Engine Plant

	Ft.
4 in.—Side Pushers—Power Returns	
Camshaft line	376
Crankshaft machining	160
Crankshaft grinding	616
Crankshaft finishing	308
Connecting rod assy.	232
Piston assy.	264
Free Lines	
Camshaft line	628
Crankshaft machining	775
Crankshaft grinding	886
Crankshaft finishing	236
Connecting rod assy.	283
Piston assy.	270
4 in.—I Conveyors	
Cylinder block &	1194
Clutch hsg. assy. delivery	524
Misc. parts to final assy.	1387
Shot blast to cyl. hd. line	323
Crankshaft & fl. cplg. assy. del.	726
Crankshaft delivery	497
Piston to final assy.	218
6 in.—I Conveyors	
Electrical assy.	949
Motor test stand delivery	693
Motor storage delivery	1145

finish-boring and honing of cylinders and these operations require a special coolant consisting of a kerosene base mixture. Accordingly, the group of Ingersoll boring machines and Micromatic honing machines for these operations is isolated from the rest of the department, insofar as chip disposal is concerned, and is connected to a Delpark paper filter system. Here the fluid, containing chips and abrasive, flows over the filter paper, depositing the chips and sludge on the paper, permitting the fluid to drain down to a sump in the floor. The fluid then is recirculated to the machines from this sump.

To avoid fire hazard the pit for this system is ventilated by means of an exhaust fan and ducted through the roof. In addition, the fluid is cooled to a controlled temperature required in the operation of the honing machines.

The centralized coolant system, therefore, is concerned primarily with the other departments where steel parts such as crankshafts, etc., are turned and ground. By standardizing upon one type of soluble oil the problem of storing, mixing, and circulation has been vastly simplified. For example, there is one large storage tank for soluble oil located at the railroad siding, making it convenient to fill directly from tank cars or truck tankers. This tank has been fitted with a thermostatically controlled suction heater for heating the oil to proper pumping temperature as it is drawn from the tank.

Within the building are four individual mixing tanks. Two tanks, each of 2500 gal capacity are used for storing the 25 to 1 mixture; two, 1000-gal tanks for the 75 to 1 mixture. The tanks are equipped with flow meters, one for oil, the other for water so as to have accurate control. One of the tanks in each pair is used for standby service only.

By the very nature of the grinding operation and its requirements of fine finish, the handling of chips and coolant requires considerably more care than in the case of other operations. Here the system is divided into two separate phases. In the first place, coolant and sludge from all grinders is piped into a central trench and is carried downward to a large settling tank of 8500-gal capacity. The trench has a downward pitch to facilitate gravity flow. In addition, the bottom of the trench is made up of a line of vitreous crock to facilitate smooth flow.

The settling tank is long with the working level of the fluid shallow to facilitate rapid settling, settling time being about 8½ minutes. The settling tank is fitted with a Jervis B. Webb endless type flight conveyor for removing sludge and metal chips. The conveyor scrapes the bottom of the tank by means of wiper blades and carries the sludge continuously out of the tank and into a skid box for disposal.

Meanwhile, the fluid in the settling tank is pumped to a large double Delpark filter unit of 1000-gal capacity where it flows by gravity through filter paper. Again, the sludge is left on the filter paper while the fluid is permitted to flow into a tank. This fluid is stored here and is recirculated to the machines for reuse.

Special mention is made at this point of some unusual features developed by De Soto engineers to improve the automaticity of chip disposal. For one thing, all machines are provided with steel baffles at various critical points to assure rapid drainage of chips and fluid into the sluices. In addition, concrete has been poured in bases and other parts of each machine to eliminate corners and depressions and, in general, to force the fluid and chips to leave freely.

Besides this, grinders and other machines have been fitted with piping and jets at various points to continuously flush the chips and thus prevent accumulations.

Another important point is that the supply of coolant to each machine is designed to flood the tools and provide an excess over conventional practice. On grinders, for example, the wheels are flooded with coolant to prevent loading. Generally speaking, the machines require only about 50 per cent of the fluid being circulated.

In similar fashion, the steel working machines—principally on crankshaft and connecting rod operations—are connected to a system of three trenches communicating with a 9000-gal capacity settling tank. The tank is long and shallow and because of the nature of the chips, settling time is only 3½ minutes.

Sluices discharging into the tank are equipped with a velocity breaking augment and discharge directly into moving conveyor buckets. The J. B. Webb conveyor is so designed as to catch the large chips and turnings and transport them upward and into a skid. The fluid, naturally, overflows into the tank.

The conveyor also is provided with wiper blades on top of the buckets and as the endless conveyor returns, the blades scrape the bottom of the settling tank. This carries fines and sludge to the opposite side of the conveyor where the material is discharged into another skid box.

The settled and screened fluid is drawn into the pump and goes immediately through a wire wound, self cleaning cartridge type filter for final cleaning before being recirculated to the machines. The screen in the filter is backwashed periodically to prevent clogging.

Like the isolated system for the cylinder boring and honing equipment, the Ex-Cell-O piston turning and precision boring machines are connected to a 150 gpm Delpark filter unit. The filter is located in a pit under the floor, the dirty coolant draining by gravity onto the filter paper, then through to the tank. At regular intervals the filter paper is removed and held for salvage.

It may be noted in passing that the central coolant system described above not only simplifies maintenance and housekeeping, but has turned out to be of considerable economy in handling the coolant problem. For example, the system provides for thorough aeration of coolant, hence it eliminates all rancidity and makes unnecessary the usual flushing of coolant in machines at regular intervals. In addition, there is no significant loss of coolant through the usual handling at each machine, the only losses being those due to evaporation and drag out. Makeup of coolant

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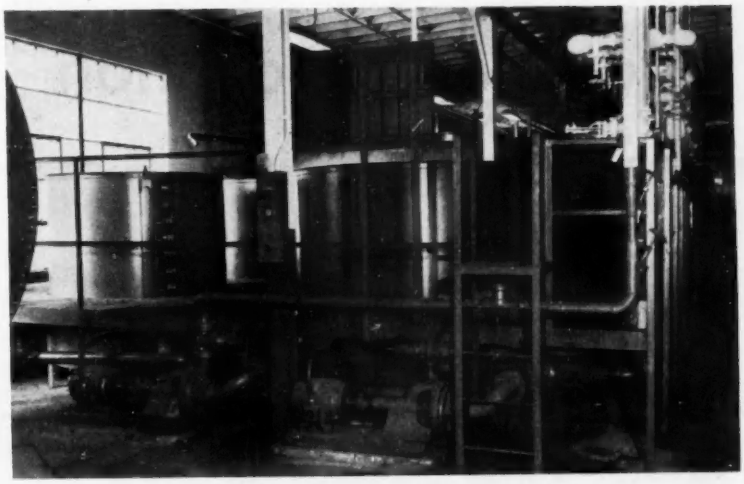
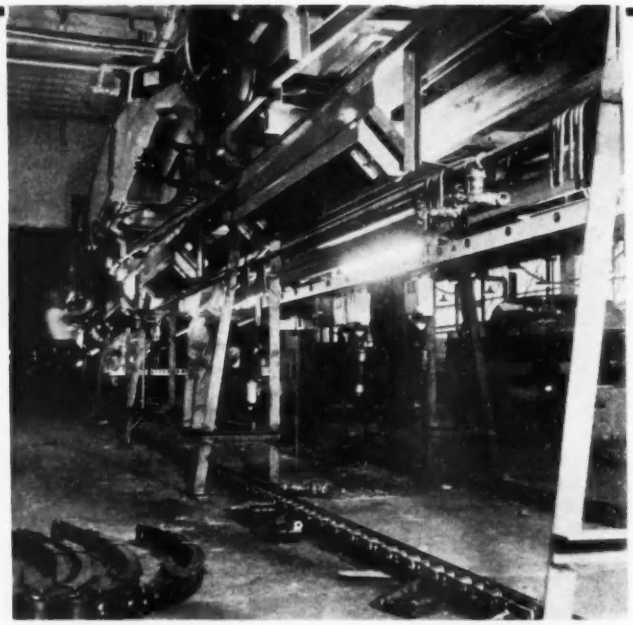


View in soluble oil storage room showing two of the mixing tanks.

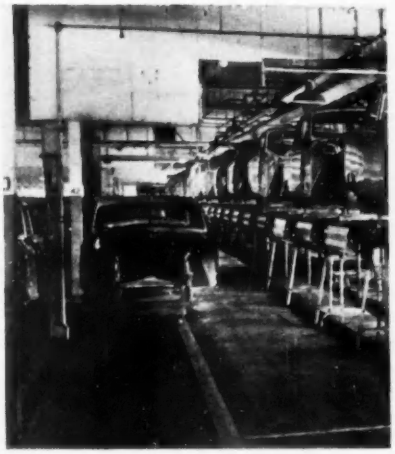
An example of the "free" conveyor system in the engine is this conveyor in the camshaft department.

Willys-Overland's Latest Equipment for Car Production

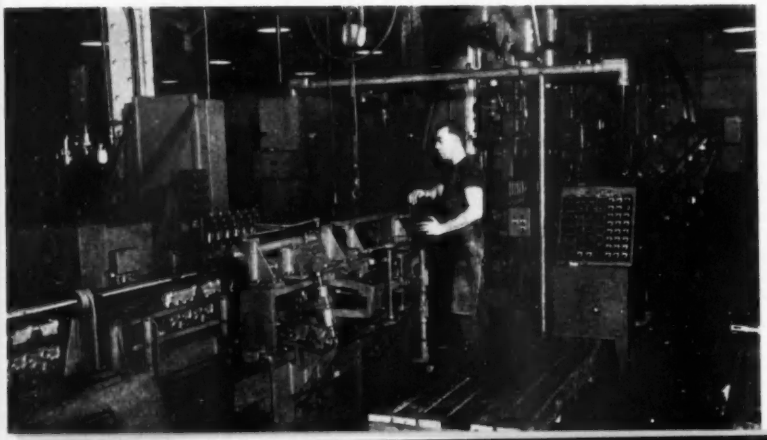
By Joseph Geschelin



This is a close-up of the assembly area along the rear section of the elevated conveyor line. Attention is drawn particularly to the fluorescent light sources and the extensive line of Bull-Dog Trol-E-Duct power system, mounted directly below the conveyor.



Running gear and suspension assemblies are installed while bodies move along the elevated conveyor line which runs some 450 ft.



Perspective of Footburt transfer machine line for machining Willys F-type cylinder heads. This line consists of two independent units, one having 15 stations, the other, nine stations.

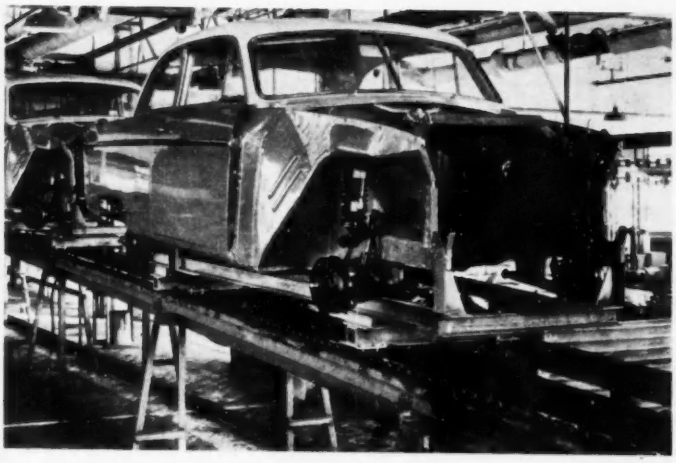
At the end of the first transfer unit is the special Colonial hydraulic machine designed for pressing-in valve guides automatically. The nine-station Footburt transfer unit may be seen directly in the background.

With the recent introduction of its new line of passenger cars, Willys-Overland Motors, Inc., has made some changes in equipment and assembly procedures of interest to our readers. From an equipment standpoint interest centers on the installation of an advanced form of transfer machine line for machining cylinder heads for the F-head, six-cylinder engine. In addition, the new integral body and chassis frame design has required some significant changes in final assembly techniques.

Consider cylinder head machining first. Equipment for this operation has been arranged compactly in a small, self-contained department with emphasis on two Footburt transfer machines—the first, a 15-station automatic unit with 155 spindles; the second, a nine-station, 42-spindle unit.

A unique feature of both transfer machines is found in the introduction of a number of automatic inspection stations for checking certain critical operations as noted in the routing. This procedure marks an added factor of safety in the operation of a transfer machine, aids in reducing spoiled work, and certainly improves quality control.

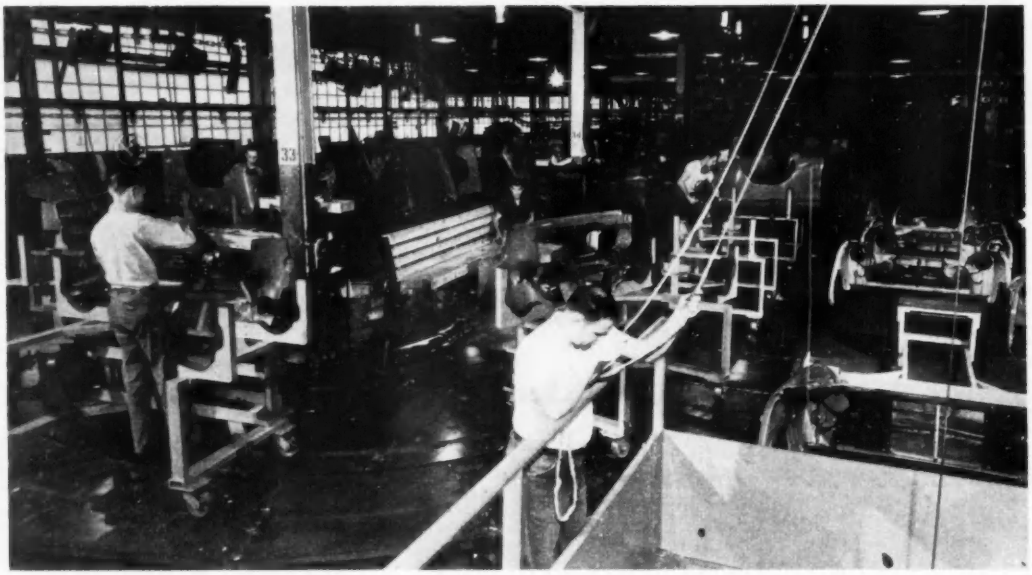
In preparation for further machining, cylinder head castings are milled on top and bottom surfaces in a big Newton vertical rotary milling machine. After inspection the work is presented directly to the 15-station Footburt for the following sequence of operations:



Station	Head	Operation
1		Load
2	LH Vertical	Drill 24 holes half through
	RH Horizontal	Spotface two pads
3	LH Vertical	Drill 10 holes, ream 2 holes
	Angular side	Drill one oil hole; drill, spotface and counterbore six spark plug holes
4	Roll-over fixture, tumble 90 deg	

It will be noted that for the first three stations the work was held flat on one face. At Station 4 it is turned on edge. Incidentally, tumbling in this fixture serves to remove most of the chips.

5	LH Horiz.	Drill 24 holes half way through
	RH Horiz.	Drill five holes, ream and counterbore one hole
6	LH Horiz.	Drill 21 holes
	RH Vert.	Drill two holes, ream and counterbore two holes
7	45 deg angular	Gage six spark plug holes
8	LH Angular	Drill six push rod holes
	RH Vertical	Drill and chamfer three holes, spotface one hole
9	LH Lower angular	Drill six holes
	RH Upper angular	Drill six valve guide holes
10	Horizontal checking station	Inspect all holes to be tapped
11	LH Lower angular	Rough valve throats and spotface top of valve seats
	RH Upper angular	Counterbore six valve spring seats
12	LH Lower angular	Semi-finish line ream six valve guide holes and six valve throats
	RH Horiz.	Chamfer 12 holes
13	LH Inspection unit	Check valve throat spotface for depth
	RH Inspection unit	Check valve spring seat depth
14	LH Lower angular	Finish line ream six valve guide holes
15		Unload



In the foreground in this view is the oval power conveyor on which are mounted 12 framing fixtures for the assembly of front end sheet metal. As these assemblies are completed they are lowered to the final assembly line, on the floor below, through the drop in the foreground at the right.

At the end of the first transfer machine the work is gaged and inspected, then replaced on the conveyor for operations in the second transfer machine. At this point there is a special Colonial automatic hydraulic press setup for pressing-in valve guides. For this operation the operator loads the hopper with valve guides and the machine proceeds automatically to clean the holes with brushes, then presses in the bushings, and stamps the last figure of the part number corresponding to the compression ratio. Heads then are gaged to verify the position of the valve guides and proceed to the nine-station Footburt transfer machine for the following operations:

Station	Head	Operation
1	Load and tumble	
2	LH Vertical	Finish ream six valve guide bushings
3	LH Vertical	Finish ream six valve throats
4	Idle	
5	LH Vertical	Chamfer six valve seats
6	Horizontal side angular	inspection unit for one hole
7	LH Vertical	Tap two holes
	RH Upper angular	Tap six spark plug holes
8	LH Horizontal	Tap four holes
	RH Vertical	Tap 12 holes
	RH Horiz. side angle	Tap one hole
9	Blow off, tumble, and unload	

Following inspection procedure the cylinder head is assembled with pilot pins and presented to the six-spindle Waterbury-Hall valve seat grinder. The finish-ground valve seats then are checked for size and concentricity and the work proceeds on the conveyor to the Centri-Spray machine for thorough washing inside and out. Final operation is water testing.

It is of interest that the compact line described above is served by a system of Logan gravity roller conveyors to facilitate movement of work from one operation to another to the end of the line.

As mentioned earlier, final car assembly operations required new treatment in view of body construction which incorporates the usual chassis frame. To meet this problem the company installed a new elevated conveyor assembly line, ahead of final car assembly, which facilitates the installation of underbody running gear elements. Serving this conveyor line are two sub-assembly stations at the side—one for making up rear axle and rear suspension parts; the other preparing the front suspension assembly for right- and left-hand sides.

As the rear and front end sub-assemblies are completed on their respective assembly lines, they are suspended on a closed circuit monorail conveyor which traverses the sub-assembly stations, carries the sub-assemblies to the start of the elevated assembly line, and returns to the sub-assembly stations. This conveyor line, installed by Mechanical Handling Systems, has a developed length of approximately 1035 ft.

The elevated body conveyor line—or "hump" line—runs some 450 ft in length. Bodies are mounted securely on a special sub-frame and the front and rear suspension sub-assemblies are installed while bodies traverse the conveyor line. As illustrated, this raised conveyor section has been fitted with an installation of Trol-E-Duct power line directly below the conveyor; and a system of fluorescent light fixtures to provide good seeing under the body.

(*Turn to page* 58, *please*)

Welding Jet Engine Parts of Heat Resistant Metals

By J. L. Solomon
Sciaky Bros., Inc.

DEVELOPMENT of the jet propulsion gas turbine was made possible because of the high development in certain methods of sheet material fabrication, one of prime importance being that of resistance welding. Figure 1 illustrates a typical arrangement of parts, some of which are welded assemblies, in a gas turbine unit utilized for jet propulsion. The combustion chambers shown in Fig. 2 consist of a number of sheet metal parts of cylindrical and conical shape, which are fabricated by resistance welding.

Components of the combustion chambers include the burner, flame tube head, air casing and the discharge nozzle. Air casings operate at low temperature and are normally fabricated from mild steel which has a sprayed aluminum coating to prevent oxidation. The flame tube undergoes extremely high temperatures and is of a nickel base alloy such as Nimonic 75. The flame tube head is made from a number of pressed or drawn parts which are stitch welded together. The body of the flame tube is made from drawn sections which are seam welded together. Between the combustion chambers and the turbine is the discharge nozzle assembly which consists of nozzles of austenitic steel welded to heavy machined flanges of a tungsten bearing austenitic steel. The exhaust unit, which lies immediately behind the turbine, consists of an outer truncated cone made of 18-8 stainless which is seam welded

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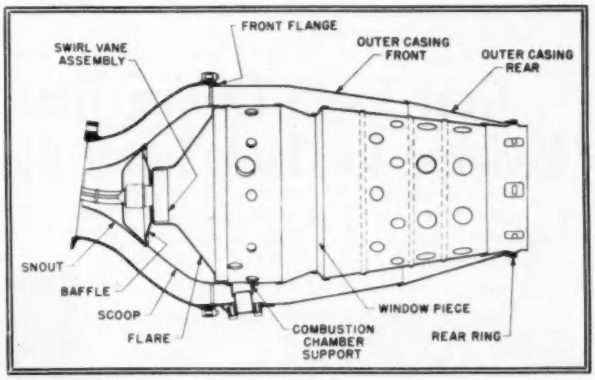


Fig. 1—Materials and component parts of a single stage gas turbine engine are depicted. Many of the components are fabricated by various welding methods.

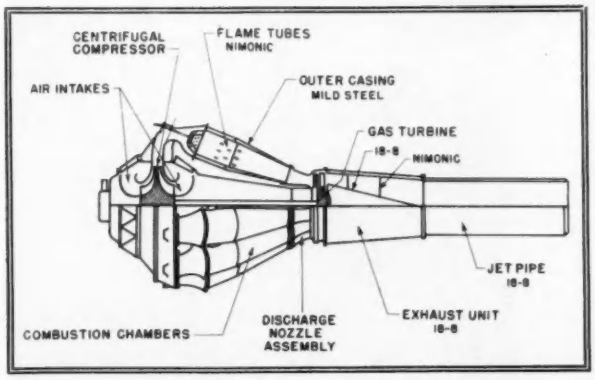


Fig. 2—Most of the sheet metal parts which make up the combustion chamber are joined by resistance welding.

How the Machine Cycle is Controlled

Electric controlled hydraulic circuit (can be operated during broach return stroke)

1. *Press cycle start button*
2. *Index mechanism resets*
3. *Index mechanism indexes part*
4. *Index plunger seats*

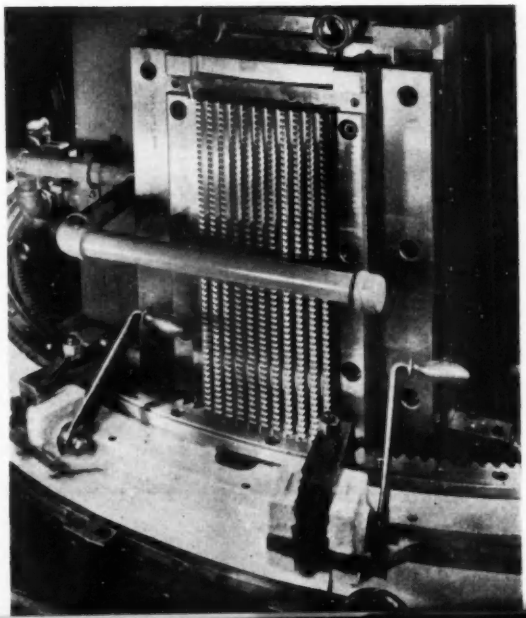
Hydraulic Controlled Hydraulic Circuit

5. *Full machine start handles*
6. *Fixture moves into broaching position*
7. *Ram contacts control finger at bottom of stroke stopping ram movement*
8. *Table backs out of cutting position*
9. *Outward table movement operates interlock switch*
10. *Ram travel reverses*
11. *Broach returns to top of stroke*

The Colonial turret ring gear tooth broaching machine in operation. One of the fixture index hydraulic cylinders may be seen at the right of the operator.

Gear Tooth Cutting Time Reduced for Tank Turret Rings

Closeup of broaching operation at the last index position.



A BROACHING machine which does in one-half hour what former methods took 4½ hours to do, and is said to be saving $400 per day in the production of turret ring gears, is now in operation at the Detroit Arsenal of Army Ordnance. Manufactured and tooled by Colonial Broach Co., Detroit, the 30-ton, 66-in. stroke, vertical broaching machine cuts the 294 internal 4-pitch teeth in the six ft diameter ring gear for tanks in 30 minutes.

The broaching machine used actually is a Detroit Arsenal surplus World War II Model VAI Colonial Broach single ram vertical broaching machine, rebuilt to accommodate a four-ton index fixture. Hydraulic power equipment that was formerly within the column of the standard machine is now mounted on a base at the rear of the machine to facilitate fixture mounting and to provide additional hydraulic

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METALS

No Permanent Copper Shortage Foreseen by Producers. March Supply of Lead Expected to Exceed 100,000 Tons

By William F. Boericke

Copper Price to Remain Unchanged

Sales of copper for February delivery totaled about 100,000 tons. The domestic price situation remains unchanged and Washington has emphatically squashed any hope that a higher ceiling price would be granted. Subsidies have been allowed to a few high cost domestic copper mines to insure they would continue in operation but these will not affect the price pattern to any extent. Meanwhile, the copper price abroad is wavering although it still is substantially higher than our 24½-27½ cent ceiling. Chile is not finding it easy to dispose of its government-controlled output (20 per cent of its production) at its asking price of 53 cents per lb.

Copper is still in tight supply but it may be a little easier than is admitted. So much emphasis has come from Washington about the copper scarcity, so much urging to consumers to adopt substitutes for copper if at all possible, that undoubtedly much scare buying has resulted and quite likely requirements have been overstated in an effort to increase allotments.

It is true that General Electric has shifted a considerable number of its products from copper to aluminum because it feels that copper will continue to be scarce while aluminum output will expand. And it is equally true that Bell Telephone, largest copper consumer in the United States, has had its allotment cut 10 per cent for the second quarter. It needs 19,000 tons and will receive only 12,900 tons. As a consequence, one million prospective telephone subscribers will not get service.

Future Copper Shortage Denied

But Washington's pleading for copper substitution has aroused the ire of the copper producers. In a national advertising campaign Anaconda Copper Co. has spearheaded the rebuttal for the copper industry. The company asserts that talk of a permanent copper shortage is not based on facts. It estimates that new copper mines in the U. S. and friendly foreign nations will boost output 450,000 tons above present production levels in three years. This would bring total United States supply to 1,800,000 tons a year, a 20 per cent increase, which is quite in ratio with the increase in steel production.

Another spokesman for the copper industry points out that in the present year the existing domestic mines will turn out 50-100,000 tons more than in 1951. He looks for a larger movement of scrap to the smelters—which isn't visible yet—and a less insistant demand from industry when the true facts are realized on increasing supply.

More Aluminum to Be Available

There is no gainsaying that copper producers looking ahead to 1953 or even the second half of 1952 see the spectre of aluminum haunting their markets. With estimated production of 1,000,000 tons in 1952 and 1,500,000 tons in 1953, and a price about one-third that of copper on a bulk or volume basis, aluminum producers are hungrily eyeing the electrical market to take a major portion of their enormous increase in capacity when the defense program and military requirements taper off.

As yet there is no surplus of aluminum to disturb the copper men. NPA has warned non-defense industries that their supplies will not increase until early 1953 because of the expanded aircraft program. But the agency has set up a special reserve to help small civilian business concerns that have been hit hard by the shortage, to begin with the second quarter.

Lead Supply Increasing

With characteristic suddenness the lead supply situation has changed. A few months ago consumers were asking NPA for four times the amount of lead that it had for allocation. In December the scarcity was so alarming that the Government was obliged to release 30,000 tons from the stockpile to industry. Europe was bidding 22-23 cents per lb for the metal and imports naturally declined because the domestic ceiling price was about three cents lower.

Within the last month the premium market for lead has disappeared abroad and Mexican lead has been available at 18.8 cents per lb, plus duty. With the suspension of the tariff, which can be re-imposed if the domestic price falls below 18 cents for any given month, foreign lead should commence to move again in volume into the domestic market. Such imports averaged 43,400 tons a month in 1950, just twice as much as in 1951. It appears likely that they will be substantially larger in 1952 than last year.

Further contributing to the lead supply was resumption of work at the Herculaneum smelter of the St. Joseph Lead Co. after a 12-week strike. This will add about 3500 tons to the February production and 8000 tons in March when the second furnace is put into operation.

It is anticipated that the March supply of lead from all sources will total over 100,000 tons. Some fear is expressed that the domestic price of 19 cents per lb may weaken. This does not appear probable. The Government is obligated to buy back the tonnage loaned from the stockpile and this should have a stabilizing effect on the market. Some of the big lead consumers, notably manufacturers of tetraethyl gasoline, want a lot more metal than they have been receiving. But it

(*Turn to page* 62, *please*)

Observations

By Joseph Geschelin

Notable Presentation

One of the most noteworthy and uncommon technical paper presentations we have ever witnessed was the job done by J. H. Booth of Thompson Products at the recent SAE Annual Meeting in Detroit. Dealing with the development of ball joints for front suspensions, culminating in the adoption of the latest design by Lincoln, Jim Booth illustrated his talk with excellent colored slides. Although many of these covered straight-forward design cut-aways, much of the material was in excellent cartoon form. The big audience enjoyed this unusual approach mainly because it relieved the tedium of the conventional technical session. We commend the presentation to other authors.

Giant Brains

Not so long ago we reviewed the book —Giant Brains—dealing with calculating machines. More recently at the SAE Annual Meeting, we sat pop-eyed at the session on the use of modern calculating machines which are being used every day in the solution of complex mathematical problems incident to the design of jet engines, propellers, and other details going into modern high altitude, high performance military aircraft. It was evident from the discussion that the digital type machine such as made by IBM is a must where extreme accuracy is required. The analog type, on the other hand, is many times faster and preferred where high accuracy is not important. Proponents of the analog technique say that the 'scope method permits the engineer to think better and stimulates his imagination.

Gearing Progress

Hobbing machine accuracy has become uncanny in recent years. Barber-Colman says that its No. 14-15 hobbing machine produces an average involute check within 0.0003 in.; while average adjacent tooth spacing checks within 0.0005 in.

Lincoln Suspension

E. S. MacPherson, Ford Motor Company, revealed at the SAE Annual Meeting that the new ball joint front suspension on 1952 Lincoln cars served as the focal point for the entire conception of the new chassis and arrangement of units. Besides resulting in effortless steering without power assist, it simplified servicing in the field, simplified assembly procedures, reduced lubrication points, and made it possible to give the engine much more room under the hood.

Guns and Butter

The current economic situation, diluted as it is with politics, proves the difficulty of centralized planning for an economy of over 150-million people. There is no evidence that Government planning has found any balance between military and civilian requirements sufficient to maintain employment. Major bottleneck is in critical materials. Something drastic is in order to make sure that stockpiling and diversions to military production are indeed necessary for our security and if necessary that diversions need be as severe or as immediate.

Aluminum Assists

A recent issue of the Alcoa *Aluminum News Letter* mentions some unusual applications of aluminum typical of forward thinking. Army Ordnance and the University of Michigan are experimenting with a storage battery employing plated aluminum grids. It is said to spin the starter at temperatures ranging from —55 F to 165 F. A quick-drying, sprayed-on plastic lacquer is used to protect the aluminum skin of military aircraft during production. It can be stripped like cellulose tape after delivery. The new lacquer can be applied on planes in service to smooth dents and scratches.

Machinery Replacement

The Rockford Insert Group which speaks for the machine tool builders of Rockford, Ill., brings up an interesting point. Durability of modern machine tools always has been an important criterion in the selection of equipment. All of the old line builders pride themselves on this feature. The question is —"Is that good?" Actually, with rising costs and rugged competition, new methods and radical changes in design place most accent on obsolescence. Many machines with lots of useful life have no place in the modern scheme when new techniques and cost-reducing methods are evolved. That is why a machinery replacement program in automotive plants is a must. Only constant study will reveal the point at which certain machines no longer earn their keep.

Who Is Looney?

Some months ago NPA issued a statement to the public advising that second quarter production would total 930,000 motor cars. Recently a number of automotive leaders, including Henry Ford II pointed out—and sharply, too—that the allotment of copper and aluminum made by NPA would permit the building of only 800,000 units. The hue and cry then was taken up by the politicians as they realized that this action would mean still further layoffs in the Detroit area. Then NPA suddenly issued a statement that a cutback in certain types of military airplanes made it possible to release aluminum. Now it appears that the industry may be able to build at least 900,000 units. What manner of planning is going on? Why was this reservoir of aluminum suddenly discovered so late?

Industrial Design

Addressing the Adcraft Club of Detroit, Henry Dreyfuss, famous industrial designer, likened his work to that of an advertising agency from the standpoint of objectives. Being realistic, his objective is to produce design that will sell the product in a mass market and produce a profit to the client. One important point made by the speaker was that despite the eagerness of the artist to create unique and unusul forms, it is a mistake to get too far ahead of the needs and appreciation of the mass buying public. It is much better business to gear a design to current trends and understanding. Design too far in advance of today may fail to win acceptance and holds too great a risk in mass production.

Low Man

With the aid of our good friends at the AMA we tracked down the origin of the term "pitman arm." The question arose at the recent meeting of Mid-Michigan Section SAE at which the audience was treated to a paper by Lincoln on the Saginaw power steering gear. Was there a man named Pitman?

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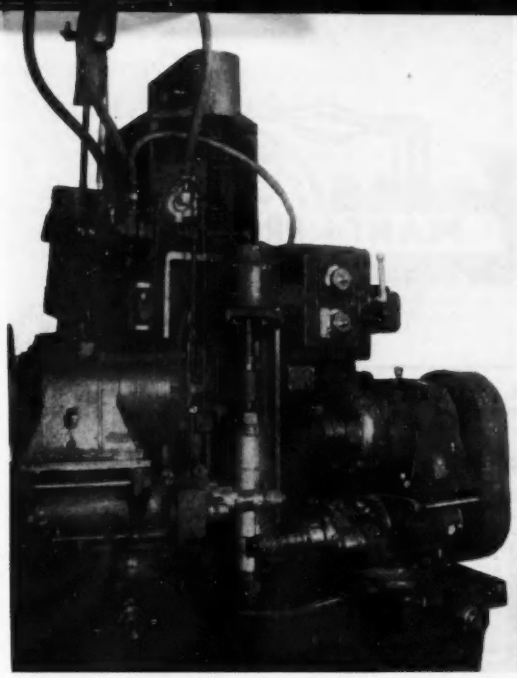

Fig. 1—Closeup of one of the Kent-Owens special milling machines for milling the ring gap. The stack of piston ring castings may be seen on the arbor in the center.

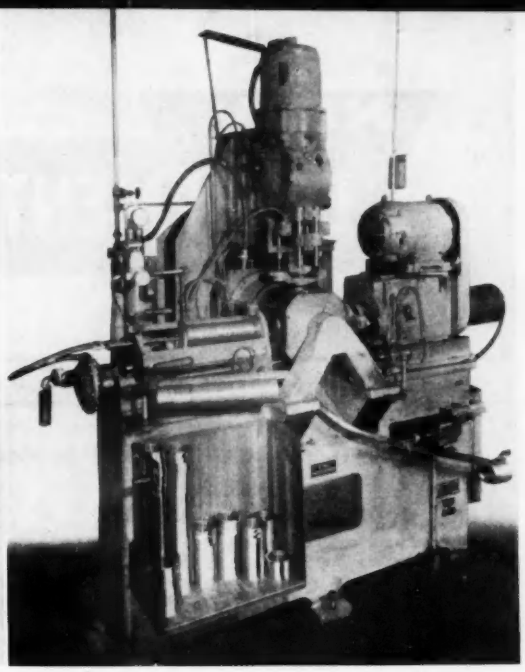

Fig. 2—One of the special Kingsbury internal boring and counterboring machines. The turret fixture may be seen in the center directly under the vertical head and the stack of piston rings in place for entry in the first station of the turret.

New Time-Saving Equipment for Machining Piston Rings

In recent years piston ring manufacturers have been making strides in production techniques to keep pace with advances in piston ring design. Several examples of advanced practice recently introduced by the Muskegon Piston Ring Co., Muskegon, Mich. are illustrated here.

Fig. 1 shows one of a battery of Kent-Owens special milling machines designed for milling the gap in a large stack of piston rings seen mounted in the center. As illustrated, the machine is equipped with two motorized spindles having a two-inch quill adjustment and mounted on cross slides permitting "in" and "out" positions as well as any desired degree of rotation about a given axis to obtain a variety of angular settings of the heads. The vertical slide for mounting the work-holding fixture is controlled hydraulically.

It is of interest that the vertical mounting was adopted to achieve two important objectives: (1) It reduces operator fatigue by requiring fewer motions in loading and unloading the arbors. (2) In operation as the table feeds down, the cast insert together with the chips fall away from the work and drop into a container at the bottom of the machine, thus leaving the rings free from this excess material.

Each of these mills is used in conjunction with a turning lathe for machining the OD after gapping. Milling is done at the rate of 30 in. per minute with a spindle speed of 300 sfpm.

One of the most important improvements in piston ring machining practice is exemplified by the 12-in. Auto-Index Kingsbury machine seen in Fig. 2. Designed for automatically boring and inside counterboring (or inside beveling) of piston rings, this compact machine comprises a four-station turret pneumatic loading fixture and two heads—one for inside counterboring or beveling, the other for boring. Each head is equipped with an outboard spindle bearing and a spring-loaded pressure pad for clamping rings into the locating fixture.

In operation a stack of rings is placed into the loading fixture and one ring at a time is pushed pneumatically through a tapered closing sleeve into a cylindrical fixture of the same diameter as the ring. The turret is then indexed to the first position. As the head moves down, actuated by cam feed, the ring is clamped by a spring-loaded pressure pad and held securely for counterboring or beveling.

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NEW EQUIPMENT PLANT • PRODUCTION

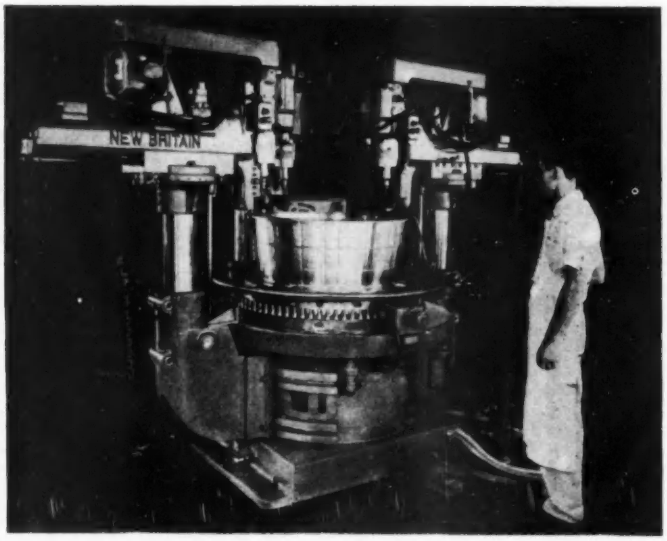
FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 49

J-31—Circular Pattern Drilling Machine

Now being delivered to producers of aircraft jet engines is unique type of circular pattern drilling machine developed by the New Britain Machine Co., New Britain, Conn.

Called Model 4A, the machine uses simple drill jigs and fixtures and has standard indexing-regulator or irregular hole spacings of from four to 100 indexes in circles up to 48-in. diam. Pieces up to 61-in. diam can be mounted on the machine. Maximum hole diameter is ½-in. in steel.

Furnished with from one to four spindles, it can drill as many as four holes at once, or it can be set up to drill, ream and tap, or to drill, ream and countersink successively at one setup of the part. Once set up, its operation is said to be very rapid.

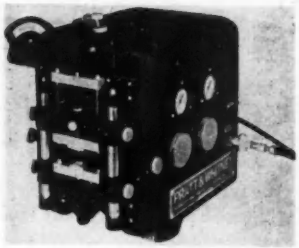


Jet engine component set up for flange drilling operation in New Britain Machine Company's Model 4A circular pattern drilling machine.

J-32—Special Type Radial Play Gage

Pratt & Whitney, Div. Niles-Bement-Pond Co., West Hartford, Conn., has developed a special Electrolimit radial internal clearance comparator that is said to give fast, accurate measurements of the radial internal clearance in ball bearings.

Chief among the comparator's parts are: A vertical cast iron base; universal external Electrolimit head with adjustable gaging spindle; floating gage head mount with calipering finger; universal power unit with magnification and zero adjustments; DO-3OU meter; adjustable pressure reversing assembly with individual pressure controls; automatic shakedown vibrator; automatic pressure reversing mechanism; interchangeable mounting spindles.



P & W special Electrolimit radial internal clearance comparator.

In operation, a bearing is placed over a mounting spindle of a size corresponding to the ID of the inner ring. The ring is located axially by a backstop on the spindle. The outer ring is free to float both axially and radially. The floating Electrolimit head assembly calipers the thickness of the bearing from the ID of the inner ring to the OD of the outer ring. By means of a cycling timer, the pressure cylinders are operated automatically and the measuring load is applied upward and downward in successive operations. When the pressure is applied upward to the bottom of the bearing, the assembly is opened at the top for maximum radial play indication. When the pressure is applied downward to the top of the bearing the assembly is closed at the top for minimum radial play indication. The successive movements of the outer ring are registered on a precision indicating meter and the difference between the two readings is the existing radial internal clearance in the bearing.

J-33—Key-Operated Pushbuttons

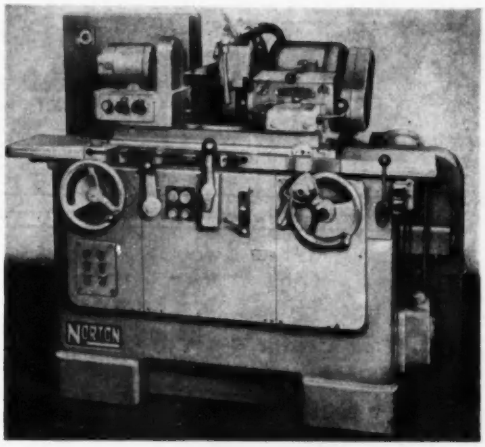
Key-operated cylinder-locks for oil-tight pushbuttons are available from Westinghouse Electric Corp., Pittsburgh, Pa.

These cylinder locks come in two basic types: the selector switch, which has either two or three rotary positions; or the pushbutton type, which can be depressed in either full or intermediate positions. Several models

cover virtually all possible conditions

These cylinder locks are mounted in place of the standard operator on Class 15-022 Oil-Tite pushbuttons for panel mounting, or in surface-mounting or flush-mounting stations. All operators of the complete Oil-Tite line are mounted in identical round holes in panels varying in thickness from 1/16 to ¼ in.

The single- or double-pole contact blocks can be mounted either in the bottom of the box or on the operator.



Norton cylindrical grinding machine, four-in. Type CTU.

J-34—Cylindrical Grinding Machine

For fast, accurate grinding of small cylindical parts, Norton Co., Worcester, Mass., has added a cylindrical grinder to its line—the Norton four-in. Type CTU. This unit is available as a plain machine or as a semiautomatic in work length capacities of either 12 or 18 in.

Wheel feeds and job set-up are said to be simplified by a graduated, wheel-feed handwheel. The graduations indicate the amount of feed as the handwheel is rotated past a fixed pointer. A click-count indexing mechanism on the handwheel provides for fine feed settings by feel. This mechanism clicks a detent on rotation of its control knob, each click representing the setting for 0.0001 in. work diameter reduction.

Grinding and truing table speeds are independently adjustable. Extremely slow table speeds are available for truing the grinding wheel.

Automatic or manual control of work rotation and coolant flow is also provided. A selector switch gives the type desired. Automatic adjustable wheel feed at table reversals with automatic reset of the wheel head, and separate dwell controls for each end of table travel are features.

The semiautomatic version of the four-in. Type CTU provides all of the advantages of the plain machine, and, in addition, provides an automatic, adjustable grinding cycle. Movement of a selector lever converts the machine for traverse grinding during which the automatic cycle functions.

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News of the Machinery Industries

Machine Tool Electrification Forum

The 1952 Annual Machine Tool Electrification Forum sponsored by Westinghouse Electric Corp. will be held at the Hotel Statler in Buffalo, N. Y., April 1 and 2. The technical program includes a progress report concerning the machine tool builders, a new milling machine, machining of high-temperature alloys, a report of the NMTBA electrical committee, and a discussion of problems in building control panels. Guest speakers will be Frederick S. Blackall, Jr., president of Taft Pierce Mfg. Co. and the National Machine Tool Builders' Association, and James Q. du Pont, public relations director, E. I. du Pont de Nemours Co.

Expansion Program

The acquisition of a new plant to house its Davis Boring Tool Div. has been announced by the Giddings and Lewis Machine Tool Co., Fond du Lac, Wis. Officials of the firm said that the plant will provide 30,000 additional sq ft of floor space. It was purchased because of the heavy demands made upon Giddings and Lewis by the defense program. The new manufacturing facilities are expected to increase Davis Tool production 50 per cent by midyear, according to officials of the machine tool firm.

Government Considering Machine Tool Stockpiling

A plan, which allegedly will eliminate the peaks and valleys from the machine tool industry through a Government stockpiling program over the next several years, is reported to be under discussion in Washington. According to reports, about $3 billion would be earmarked over the next four years to be spent for machine tools, presses, heat-treating equipment, and other metalworking machinery.

Details of the plan have not yet been completed, but, in general, it would involve purchases of equipment under the direction of a special commission, with the tools to be warehoused as near as possible to defense installations for use on short notice in the event of war.

It is recognized, of course, that the question of obsolescence would have to be watched carefully, but it is felt that the equipment stockpile, when added to machines already in operation, could meet 80 per cent of the requirements for all-out war production. The remaining 20 per cent would be tools least suitable for stockpiling because of special specifications for particular models of weapons. In the event of war, it is claimed that production could be concentrated on these special tools with the standard equipment already on hand.

Welding Conference Scheduled for Detroit April 16 to 18

The third annual American Institute of Electrical Engineers welding conference has been scheduled for April 16, 17 and 18, in Detroit, Mich. Joint sponsors of the conference with AIEE are the Detroit section of the American Welding Society and the Industrial

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NEW EQUIPMENT PLANT • PRODUCTION

For additional information regarding any of these items, please use coupon on page 49

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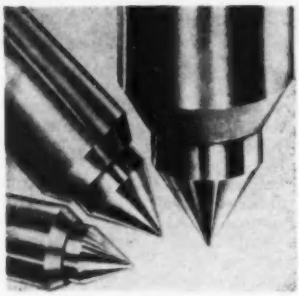
J-35—Dead Center Of Exmet



Exmet, one of the alloys used for jet engines, is now being used in the DoALL Co., Des Plaines, Ill., Super-Center, a dead center for use on lathes and grinders. The Super-Center is claimed to be the answer to the problems of galling, burning and frequent lubrication. These centers are available in all sizes of Morse, Brown & Sharpe and Jarno tapers, both in conventional styles for lathes and in a gashed type for grinding operations or turning where extra clearance is needed.

J-36—Reinforced-Flexible Grinding Wheel

Norton Co., Worcester, Mass., has announced a reinforced, flexible, hub-type grinding wheel known as the Norton BFR wheel. With the BFR rough grinding, finish grinding, and notching can be done on same wheel, according to the maker.

Norton grinding wheel, BFR.

Designed for use on right angle or sander type portable grinders, this wheel is made of carded web material impregnated with abrasive grain. Generally, the new BFR wheel can be used to smooth down welds, blend surfaces on contours, and notch risers in castings.

Strength is achieved by a safety web built into the back of the wheel. Should breakage occur, the web is designed to hold pieces together until the machine can be stopped.

J-37—Mechanical Indexing Table

A mechanical indexing table, known as the Hautau-Turndex, is said to be able to move heavy loads from station to station within 3/5 sec indexing time. The unit is being manufactured by Turner Bros., Inc., Ferndale, Mich., who state that its design is based upon an entirely new pattern of movement, every cycle of which is controlled by the uniform gear tooth area of a master sector gear.

It is stated that the significant feature of the table is the set of cams which control the master sector gear. These cams are designed to directly govern the acceleration and deceleration of the table in order to completely eliminate abrupt starting, stopping, or catapulting action.

One hp is required to operate a 24 in. unit with an 800 lb work load on the table top.

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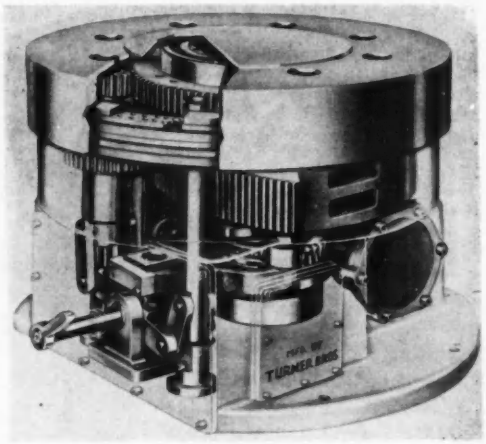

Turner mechanical indexing table, the Hautau Turndex.

News of the Machinery Industries

(*Continued from page* 47)

Electrical Engineers Society of Detroit.

A comprehensive program of papers and exhibits, together with a plant trip, is being planned for the event. The papers and exhibits will cover the latest welding developments.

Large Piston for Honing Machine

Miller Motor Co. has put out a 22 ft stroke hydraulic cylinder for use on the Planet Products Co. automatic cylinder operated honing machine. The machine hones air and hydraulic cylinder tubing to a 15 micro-inch finish in up to 22 ft lengths and 20 in. bores. The Miller hydraulic cylinder is 24 ft in length.

Group Buys Interest in Baker Bros., Inc.

A New York group has acquired a substantial interest in Baker Bros., Inc., producer of machine tools for the automotive industry and special machinery for the glass industry. The group is headed by F. W. Richmond, chairman of the Brubaker Tool Co. and president of Ralston Paper Co. A. L. Baker, president and general manager of the 83-year-old tool firm, stated that there would be no changes in operation.

Publications AVAILABLE

New Industrial Literature listed in this department is obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

H-51 Instrument Transformer Buyer's Guide

General Electric Co.—The 1952 edition of the Instrument Transformer Buyer's Guide, containing basic, up-to-date information on the complete line of GE instrument transformers, has just been released by the company's Meter and Instrument Dept.

Fully illustrated, the 94-page publication, GEA-4626E, gives ratings, ASA accuracy classifications and prices of all G-E indoor and outdoor potential and current portable transformers. Listings of ratio and phase-angle tests, together with tables covering the mechanical and thermal limits of current transformers are also included.

H-52 Time Saving Die Set Features

Danly Machine Specialties, Inc.—A 12-page booklet entitled "Save Tooling Time" has been announced. The booklet is especially prepared to present the tooling advantages, in both time and cost reductions, offered by Danly precision die sets. Four major factors involved in die set convenience and efficiency are discussed in detail . . . wide range for selection, prompt delivery, reliable precision and special modifications to accommodate unusual dies.

H-53 Press Brake Design

Verson Allsteel Press Co.—Design details and specifications of the complete line of Verson press brakes with capacities from 15 tons up are given in a recently issued catalog. Both mechanical and hydraulic types are covered.

H-54 Gage Block and Gage Accessories

DoALL Co.—Just published is a comprehensive catalogue, "Gage Blocks and Accessories for Modern Measurement Control." It includes descriptive matter and illustrations to explain the increasing importance of measuring with gage blocks and light wave interference bands. Included are sections on the basis of dimensional measurement need for gage blocks and gage block quality.

H-55 Oscillating Conveyors

Link-Belt Co.—A 24-page illustrated book, No. 2444, on positive action oscillating conveyors for conveying, feeding, cooling, screening a great variety of loose bulk materials has been announced. The book includes dimensions, weights, and capacity and horsepower charts on Torsion Mount oscillators for heavy duty as well as for the recently announced Flexmount Oscillator for the lighter-duty applications.

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TIME SAVER COUPON

THIS TIME SAVER COUPON is for your convenience in obtaining, WITHOUT OBLIGATION, more information on any one or more of the publications described above OR New Production and Plant Equipment OR New Products items described on other pages.

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Your Name ..... Your Title .....

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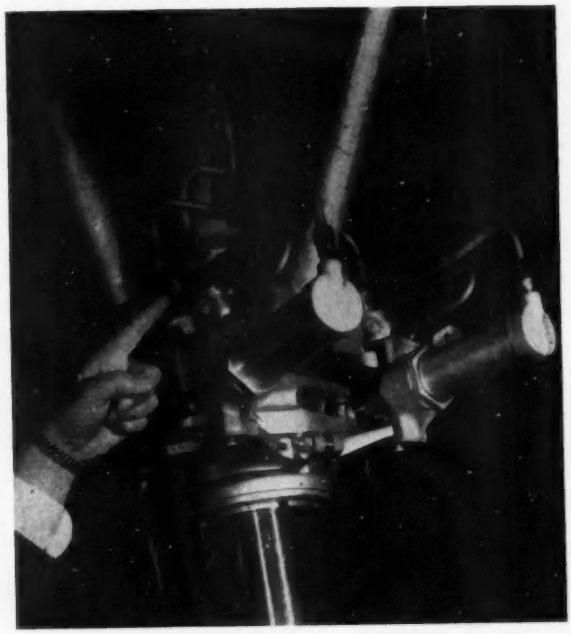
Address .....
(Street & No.) (City) (Zone) (State)

Nose wheel oleo strut with hydraulic actuator cylinders on Douglas DC-6.



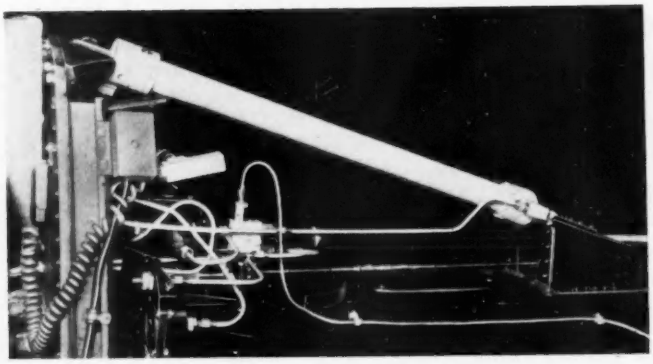
Many Automotive and Aviation Uses for Hydraulic Fluids

INCREASING demand for mechanized and pushbutton controlled devices in automobiles and aircraft has given added importance to hydraulic systems. The automotive industries are interested in such systems both as parts of their products and as parts of handling and production equipment in their plants. The purpose of these hydraulic systems may be remote actuation, as in many aircraft applications; force multiplication, as in the clamping mechanism of a spot welder; precision control, as in positioning of tools or work in machine tools; simple automatic actuation, as in several kinds of automatic molding presses; and as the actual means of operation as in hydraulic presses, broaches, etc. Most applications use hydraulic fluids for several of the above purposes.

The hydraulic fluid used must be, under some conditions of use, noncorrosive, nonfreezing, nonvolatile, fire-safe, self-lubricating, and nontoxic. In addition, it should have long service life, suitable specific gravity, and desirable viscosity and viscosity index. The phrase "under some conditions of use" is important, because insistance on all of these requirements all of the time would unnecessarily limit the list of suitable fluids and increase costs. For example, hydraulic fluids for automobile brakes are customarily petroleum oils that meet most of the conditions except that they are flammable, but in vehicles carrying gasoline or Diesel oil as fuel, and inflammable lubricating oils, there is no point in specifying a nonflammable hydraulic fluid. Aircraft applications, upon the contrary, require nonflammable fluids to cut down the fire hazard as much as possible, especially in positions such as found, where the fluid cannot be isolated.

Requirements for hydraulic fluids in aircraft are particularly severe because of the service conditions.

(*Turn to page* 66, *please*)



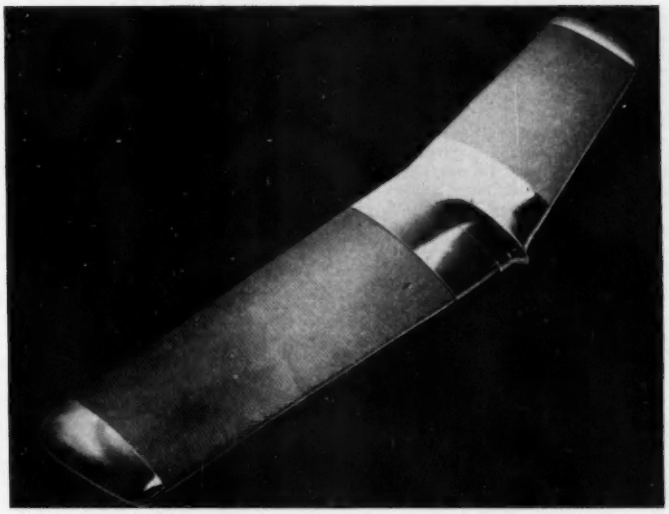
Pilot's enclosure actuating cylinder.

Wider Uses Found for
Textured Metals

As an aid in the conservation of certain material vital to the defense effort, many plants in the automotive industries are specifying the wider use of textured metals in product design. Textured metals (AUTOMOTIVE INDUSTRIES, Sept. 1, 1948) are engineered to redistribute the strength throughout the cross-section of the metal. Section thickness of the metal is increased to provide for greater strength, thereby the use of lighter gage metal is feasible for applications formerly requiring heavier gage stock for increased rigidity.

Made of ferrous and nonferrous metals, the textured sheets are finding many new uses in the transportation industry. Rigidized Metals Corp., producer of textured metal sheets, claims that over 150,000 bus seat backs have been made with the relatively new material. Sheets of textured metal have also been used for luggage and parcel racks, interior trim, step risers, and scuff pads on public conveyances.

Work has been done on the use of these metals for truck panels and flooring. One of the considerations is to lighten vehicle weight. In automobiles, recent designs have had trim, kickplates, radio grilles, sill plates, and flooring made of Rigidized metals. Another application, which is in the consideration stage, is the use of the metal for pedal pads. An accessory unit, windshield visors, for automobiles is currently being manufactured from Rigidized metals. For this particular application, the inherent rigidity of the textured metal aided in solving the vibration problem caused by high wind velocity.



Automobile windshield visors are being produced with textured metals.

These bus seat backs are made of stainless Rigidized metal. Over 150,000 seat backs have been made from the textured metal.

EQUIPMENT PLANT · PRODUCTION

For additional information regarding any of these items, please use coupon on page 49

(*Continued from page* 48)

Standard units are available in from two to 26 stations, in any equal division of 360 deg, but the table may be adapted to a larger number of stations if desired, or applied as a driving unit for indexing larger rotary tables up to 12 ft diam.

The table is being adapted for milling, drilling, reaming, boring, counterboring, crimping, stamping, assembling, etc. It has been adapted to mechanical handling operations on assembly line procedures for the purpose of rotating parts to various degrees for machining, and for simple positioning on the line.

J-38—Atomic Hydrogen Transformer Welder

A redesign of its atomic-hydrogen transformer welder, incorporating a hot-start circuit, silicone insulation, and an extra-wide current range, has been announced by the General Electric Co., Schenectady, N. Y. The design, according to G-E engineers, permits a 17 per cent reduction in price.

It has a current range of 10 to 100 amp which is divided into two sections, 10 to 35 amp, each extending the entire length of the indicator scale. This, the engineers say, allows precise current settings.

Other advantages of the new welder are noted as a longer coil life because of the silicone insulation, faster starting with the new hot-start circuit, and a range switch to change from one current range to another without moving the welding cable.

The welder operates on 60 cycles, single phase voltage, with a 75 amp rating. It is 41½-in. high, 18¾-in. in diam and weighs 350 lb.

J-39—Flexible Hose

The American Ventilating Hose Co., New York, N. Y., has announced the development of a light weight, flexible hose made with neoprene compounds and laminated nylon chafer duck. For pressure and vacuum services, this wire-reinforced Flexaust type hose has been designed for operations involving abrasive dust collection, heavy flexing and gravity feeds, etc. Sizes range from 1½ in. to 24 in. ID.

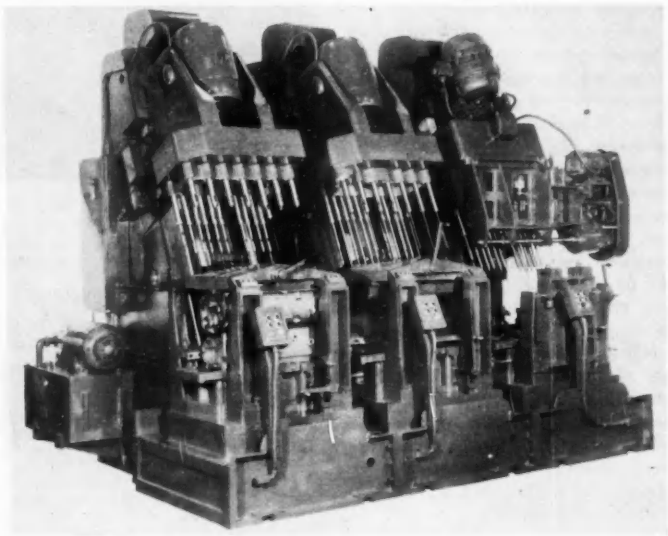
J-40—Hot-Spray Paint Heater

For hot spray automotive refinishing, a paint heater has just been introduced by Bede Products Inc., Cleveland, Ohio. The Bede Model R paint heater offers wide versatility, heating from a small quantity of lacquer or enamel, up to six quarts at one time. Finishes can be heated directly in the gun-cup, in original containers up to a gallon, or mixed in the heater pot. Heater has sufficient capacity to heat several gun-cupfuls at one time.

The heating element is cast in an aluminum explosion - proof housing, which also contains all electrical controls. An adjustable thermostat accurately controls and maintains paint heat at the temperature desired. A safety fuse automatically prevents overheating.

Bede hot spray paint heater, Model R.

J-41—Manual Transfer Drilling and Milling Machine



LeMaire Tool & Mfg. Co., Dearborn, Mich., has recently installed a three-station manual transfer machine to drill, spotface and tap 11 holes; drill seven oil holes from crank bore into oil gallery and mill seven main bearing insert lock grooves in a truck manufacturing plant.

This machine consists of three angular columns, with #15 VS slide type drilling units at stations #1 and #2, with 18-spindle drilling head at each station and #10 VS slide type unit at station #3, this unit having 11-spindle lead screw tapping head and seven-cutter milling unit. Three individual fixtures are arranged with rollers so crankcase can be progressed by hand from station to station. In each fixture part is moved to rough stop and then lowered over locating plugs in each end cylinder bore and against adacent head face.

The tapping head and milling unit are carried on a hydraulic feed slide unit that provides the feed for the milling cutters. As the milling cutters are being fed into the work, taps are fed in, reversed and backed out by individual lead screw spindles. Production is approximately 17 parts per hour at 100 per cent efficiency.

NEW PRODUCTS

FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 49

K-63—Air-Cooled Engines

Numerous improvements have been built into Continental Motors Corp., Detroit, Mich., vertical-shaft air-cooled models for 1952, the company reports. The refinements apply both to the 1½ hp AW-7 and AD-7, their two-hp companion models, the AW-7B and AD-7B, and also to the recently added 2½ hp AD-8 and AW-8.

Positive lubrication of the connecting rod and the cylinder wall has been achieved without the addition of any new moving parts. A metal tube of small diameter is inserted in the lower crankshaft counterbalance lobe, with its lower end projecting into the oil reservoir in the base. This tube pierces the lobe at such an angle that when the engine is running, oil is picked up and ejected forcibly at the level of the connecting rod, to maintain a lubricating mist there and in the bore at all times.

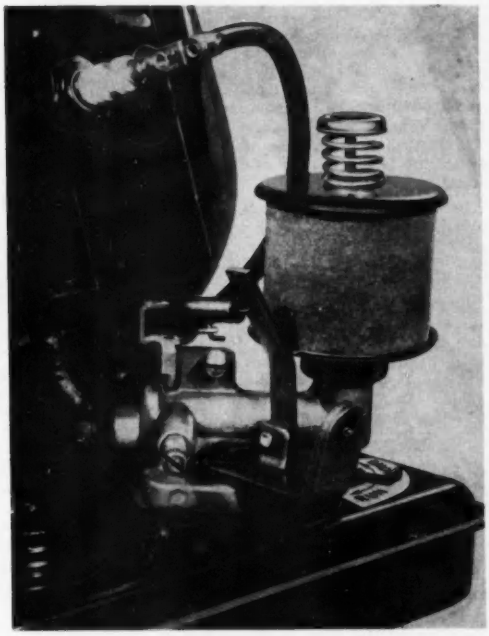
Foreign material is excluded from the air-cooling system by means of a rotating screen, held in place by the starter pulley. It can be removed quickly for cleaning.

Oil level dipstick in the base affords quick and easy means of checking oil level without removal of a plug. The crankcase is equipped with ball-check type breather, with floating cap, which insures against dirt and water entering crankcase.

Large increase in cooling capacity has been obtained by means of a new backplate, with a larger metering slot, allowing 50 per cent more air flow.

Two heavy-duty bearings in the base provide rigid support for the crankshaft, which is of extra-large diameter at the take-off end.

Options available on engines of the seven cu in. series include complete new cylinder block with improved finning, which is standard on the eight cu in. series. The latter's seven-bolt cylinder head also is optional on the seven cu in. series. For extra lugging performance, Zenith or Tillotson carburetor may be had. Oil bath and large-capacity automotive type air cleaner are optional items also.



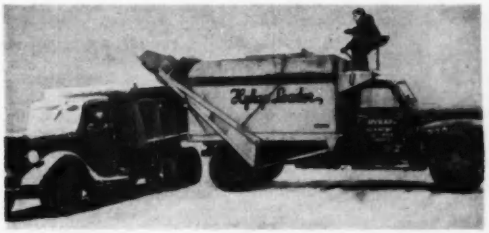
Four of the latest improvements in Continental Motors' air-cooled models are shown here. They are the automotive-type air-cleaner, the rotary choke control below it at right, Boden cable transfer lever, and new and simplified metering valve assembly.

K-64—Truck Loading Device

For high-speed loading of trucks, Efficient Equipment, Inc., Chicago, Ill., has recently developed Hykap Loader with various allied equipment combinations. The loader, which is adjustable to any size dump truck, consists of an attachable shovel or magnet, arms, and hydraulic equipment. It can be used as a hydraulic lift platform for loading drums, bales, crates, or shop-box containers. It also can be utilized as a light crane for lifting materials into other trucks, bins, and low gondola freight cars.

Hykap is mounted on the rear of the truck body and is operated by controls

(*Turn to page 54, please*)



Efficient Equipment loading device, Hykap.

NEW PRODUCTS

For additional information regarding any of these items, please use coupon on page 49

(*Continued from page 53*)

on the top of the truck cab or from auxiliary controls on the side of the truck. By engaging a fork attached to the truck transmission and by slipping a four-fingered attachment over the steering wheel, the loader is made ready for operation. In this manner, the driving apparatus on the top of the cab in attached and detached. The hydraulic arms of the loader work directly off the power takeoff of the vehicle itself.

A complete set of controls including clutch, gas pedal, steering wheel, and gear shift is located on the top of the cab. Two levers, one to open and shut the shovel, and the other to operate the hydraulic cylinders that raise and lower the arms are also located on the top of the cab. From his seat on top of the cab, the driver of the truck can operate the Hykap Loader, and drive his vehicle in any direction without having to climb down from his perch.

K-65—Transmission Oil Checking Device

Oil-Eye Corp. of America has now made available seven single Oil-Eye fitting kits for transmission checking only.

These seven units are designed for checking of the fluid in the Dynaflow Powerglide, Hydra-Matic, Ultramatic, Fordomatic, Merc-O-Matic and Studebaker Automatic Drive transmissions. Installation includes mounting the Oil-Eye gage on the instrument panel and replacing the conventional transmission dip stick with a tube type for connections to the gage mounted on the dash. Oil-Eye engineers state that these installations do not interfere with adding transmission fluid or checking the level with the regular dip stick.

Oil-Eye unit for checking automatic transmission oil level.

K-66—Cooling System Filter

Spark-O-Liner Corp., Minneapolis, Minn., has announced the introduction of a general utility model of the Perry cooling system filter and conditioner. Designated as model E, the filter is designed for cooling system capacities from five to 10 gal. The model includes a new goose-neck outlet connection designed for simplified installation.

K-67—Plastic-Cased Batteries

Gould-National Batteries, Inc., Trenton, N. J., has announced a line of plastic batteries for stand-by emergency power. Because of their light weight, the plastic-cased batteries are also being manufactured for aircraft use. The line is available over a capacity range of from 10 amp hr to 100 amp hr—at the eight hr rate of discharge.

The polystyrene containers are said to be 40 per cent lighter in weight than conventional containers, are smaller in overall dimensions, do not react with electrolyte, and are transparent.

K-68—Power Take-Off

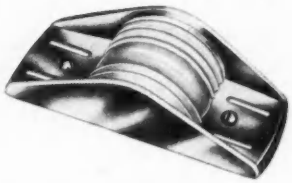
The Tangen Power Drive, put out by Mobile Power, Inc., Detroit, Mich., is a power take-off unit which can readily be installed in standard trucks which have standard transmission units. It is installed as an integral part of the transmission and makes available 97 per cent of the engine power for auxiliary power purposes.

Mobile Tangen Power Drive.

Power is transmitted through the main drive gear in the transmission, and power is available whether the vehicle is in motion or stationary. Governor control permits operating the vehicle at desired rate of speed while maintaining rpm required in the power drive shaft to give desired power output. It eliminates the need for a separate auxiliary engine for power applications.

The Tangen Power Drive can be applied to trucks for operating arc welders, pumps, compressors, cement mixers, saws, and other power tools.

K-69—Armored Clearance Light



One of three Pathfinder accessory lighting equipment items recently placed on the market by Auto Lamp Manufacturing Co., Chicago, Ill., is the No. 476 armored clearance light. This is a curved lens unit with extension armor guarding the lens. The metal housing is a streamlined one-piece assembly. Dust and moisture are said to be permanently sealed out by the gasket-seal. Finished in bright metal with red or amber lens, it is supplied complete with 3 cp bulb and necessary wire for installation.

K-70—Piston Rings

The Sealed Power Corp., Muskegon, Mich., has announced a line of chrome piston ring sets to be known as KromeX. These sets will feature a chrome alloy top ring, with chrome on the face plus a steel oil ring with chrome on the face of the steel rails.

Testing Brakes Under Severe Operating Conditions

(*Continued from page* 29)

one in. long, is shown in Fig. 1, page 28.

As pictured, this assembly fits into a hole drilled through the brake shoe and lining (one thermocouple for each wheel), and its copper tip projects into the air gap that exists between the brake lining and the brake drum when the brakes are released. When the brakes are applied, a small spring in the thermocouple assembly causes the copper tip to contact the drum with a two-ounce pressure.

Although at first it was feared that the sliding friction of the thermocouple tip against the drum would introduce erroneous temperature readings, prolonged testing showed that the temperature rise due to friction was sufficiently small to be discounted during the relatively short periods of brake application.

ElectroniK strip chart potentiometers, one of which is mounted on the chassis of each truck, as shown in Fig. 2, were used for recording. Because of the vibration, ball point pens were used.

Each potentiometer is wired into a selector switch mounted in the truck cab. Thus, the driver, without leaving his seat, is able to obtain instrument readings for any one of the four wheels, or for the parking brake drum or lining.

Since the instrument requires a source of alternating current, converters are employed to change the d-c from the truck's electrical system to a-c.

Shown in Fig. 3 is a section of an actual chart taken from a typical test run. This test, which was run on a Ford truck, was made over a three-mile down-grade stretch on a mountain road. It shows the temperatures developed in the brake drum of one rear wheel during a series of snub stops from 22 to 17 mph, with the truck in the first gear below direct drive. Peaks on the chart show temperature rises caused by repeated brake applications.

As shown, the first brake application increased the drum temperature from 120 F to approximately 195 F. The test progressed over a three-mile run during a time interval of about nine min. Time markings on the chart pictured have no significance as a high chart speed was used. Since this heavily loaded truck was brought from 22 to 17 mph, on a steep down grade, a total of 37 times in nine min, it is not difficult to see why the drum temperature should rise from 120 deg to a final maximum of 525 F.

During the latter part of the test run, the truck was driven approximately one min at 40 mph, then brought to a complete stop. The chart shows that the brake drum temperature dropped from 525 to 320 F during this one min run, jumping to a maximum of 565 F at the end of the final brake application.

The series of closely spaced peaks near the upper extremity of the chart record indicate that at this point the driver checked the temperatures of the other three brake drums by means of rotating the cab-mounted thermocouple selector switch.

With the present single-pen ElectroniK instruments, the temperature of only one brake drum can be continuously recorded during a series of test stops. Present plans call for the installation of a number of duplex ElectroniK recorders. With these instruments, each of which incorporates two separate measuring systems and two recording pens, it will be possible to obtain, on the same chart, continuous records of the temperatures of one front wheel brake drum and one rear wheel brake drum. This information is, of course, valuable in determining whether the over-all braking system is evenly balanced so that each of the four brakes absorbs its share of load.

Design Features of T-41 Tank

(*Continued from page* 26)

By changing the design to a light single pin construction and incorporating more lateral stiffness, it was made practically impossible to throw the new track. The track has an octagonal pin which inserts into octagonal tubes to which rubber is vulcanized, and then the bushing and rubber assembly is pressed into the track block. The rubber bushings absorb the twist of the track blocks as they hinge over the sprocket and idlers. On tests, this track has run over 4000 miles on all types of terrain without failure of rubber bushings or track block castings. Note the removable rubber pad which provides a means for operating the vehicle on hard surface roads without damage to the road from the steel grousers. When in combat or when more traction is desired, these pads can be removed and the full grouser action of the track obtained.

On Fig. 8 note the employment of formed rolled homogeneous armor for the turret. The product engineering division made a complete study of the T41-E1 in an attempt to eliminate as much cast armor as possible. This was necessary because cast armor was in short supply and it was found that it was quite difficult to control the dimensions of the rather large pieces to the limits that were necessary for mass production. This study eliminated over 4000 lb of cast armor per vehicle by changing over to formed rolled homogeneous armor or to forgings. An example of one of the large savings in cast armor was the change from the cast grille bar for air intake and exhaust to a forged section.

The foregoing article is an abstract of a paper presented recently by the authors at the Detroit Section, SAE.

New Time-Saving Equipment for Machining Piston Rings

(*Continued from page* 45)

The ring is then indexed to the second position, again clamped securely by means of the spring-loaded pressure pad, and the second head feeds in by cam feed to bore the inside diameter. Boring is done with a diaphragm type tool holder which permits pneumatic retraction on the return stroke.

At the third station the ring is ejected by power and drops down a gravity slide. Rings moving on this slide are stopped by an outboard bearing which supports a serrated locating pin. This pin serves to rotate the ring until the gap rides over the pin, thus permitting the ring to leave the slide and then follow a "T" slide on which all ring gaps are properly aligned. This slide may be seen leading rings out of the machine for unloading.

The machine seen here, one of a battery, operates automatically with a spindle speed of 300 sfpm and a feed rate of 0.012 in. per revolution, and is capable of machining approximately 800 rings per hour. Since these machines are completely automatic in operation and require little attention, a single operator can readily tend several of them.

Details of the New Cummins Horizontal Opposed 200 Hp Diesel

A RECENT addition to the line of the Cummins Engine Co. is the Model NHHB-600 horizontal opposed Diesel, a "flat" or "pancake" type suitable for underfloor installation in buses and railcars. This new engine was illustrated in the February 15 issue of AUTOMOTIVE INDUSTRIES, page 19.

The cylinder block, integral with the crankcase, is of alloy cast iron and is fitted with removable wet-type liners. Cylinder heads are cast in pairs.

The crankshaft is of seven-bearing type with Tocco-hardened journals; and is dynamically balanced within two oz in. It is fitted with the Houde viscous type vibration damper. Main bearings, of 4½ in. diameter, are of interchangeable type with steel shell and copper-lead alloy lining. They have a continuous oil groove to assure even distribution of lubricant.

Valves are located in the head, with two intake and two exhaust valves per cylinder. Exhaust valve seats are Stellite inserts. Both intake and exhaust valves have a 1¾ in. diameter head, valve lift for exhaust valves being 0.420 in. Valve timing is as follows: Inlet: opens 20 deg btc; closes 50 deg atc. Exhaust opens 55 deg btc, closes 25 deg atc. Injector timing is arranged for injector travel starting 50 deg btc, injection ending 20 deg atc.

Connecting rods are of alloy steel forgings, heat treated, and rifle-drilled for pressure lubrication to the full floating piston pins.

Condensed Specifications Cummins Diesel NHHB-600 Horizontal Engine

Type	Valve in head
No. cylinders	6
Bore (in.)	5⅛
Stroke (in.)	6
Displacement (cu. in.)	743
Bhp (max.)	200 @ 2100 rpm
Torque (max.) lb ft	535 @ 1200 rpm
Compression ratio	15.5 to 1
No. main bearings	7
Weight (lb)	2285

Pistons are of aluminum alloy with cam-ground skirt, fitted with three compression rings and one oil ring.

Camshafts are of drop forged steel with seven, two-in. diameter bearings. Bearings and cams are carburized and ground. Timing gears are of helical type, made of high-alloy steel and heat treated, with face width of 1¼ in.

The fuel pump for this engine is the exclusive Cummins DD, double disk type, with a single plunger for metering the fuel to all cylinders.

The engine is fitted with a mechanical flyball governor built integral with the fuel pump. The governor has two speed control springs—idling or no-load control; and maximum speed control, non-adjustable. It is adjusted at the factory for a maximum speed of 2100 rpm, and provides regulation in the range of five to eight per cent.

Because of the nature of the design, the engine employs dry sump lubrication with full pressure feed to all bearings through drilled passages. The oilpan is of aluminum. The pump is of gear type, mounted outside the gear case housing. A pressure regulating valve protects both filter and engine from excessive oil pressures. The oil strainer, mounted in the pressure line, is provided with a removable and easy to clean element and contains a built-in by-pass valve.

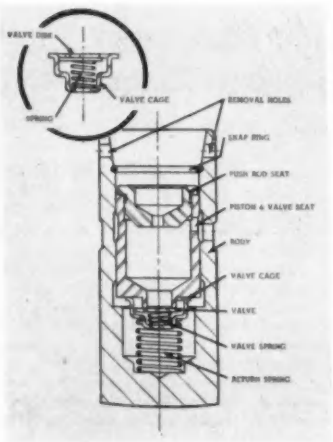
Cooling is by means of a centrifugal type, gear-driven water pump, water being introduced through metered openings. Thermostats are provided for main and radiator by-pass flow control.

The engine also is provided with a water-cooled oil cooler provided with an oil pressure by-pass.

Delco-Remy 12/24 volt electrical equipment is supplied, with 24-volt starting motor; 12-volt, 50-amp generator; voltage regulator, and push-button starting switch.

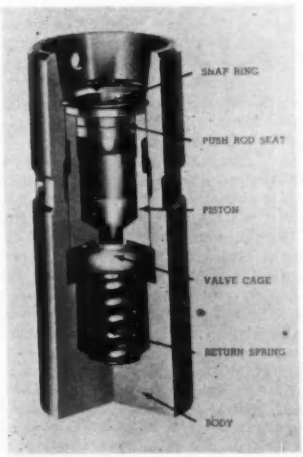
• • •

Improved Hydraulic Tappets for New Lincoln Engine



Illustrated here is the hydraulic tappet manufactured by Johnson Products, Inc., Muskegon, Mich. This improved tappet has been adopted as standard equipment on the 1952 Lincoln V-8 engine. Feature of the new tappet is the use of a flat disk valve backed by a light spring, these elements being confined in a sheet metal cage.

In addition to the new disk valve, the tappet has two holes at the top end of the body to facilitate removal. Plungers are selectively fitted in tappet bodies to assure close fits. A noteworthy feature is that the tappets operate on engine oil line pressure.



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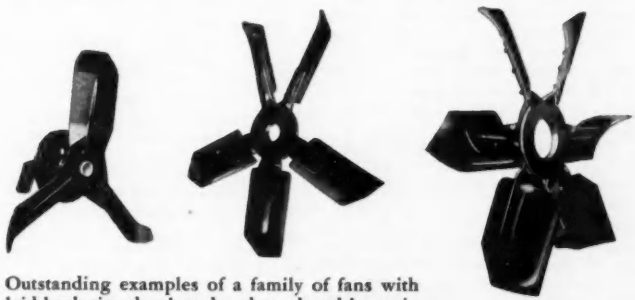
For over a third of a century we have been suppliers of cooling fans to the automotive industry; in many cases the chief supplier to whole divisions within the industry. For instance, today practically all leading engines in the fast growing Diesel field carry Schwitzer-Cummins fans along with other Schwitzer-Cummins products.

Pictured at the left is a 40″ diameter heavy duty fan used on several large capacity oil engines and for stationary applications as well.

A thermostatically controlled fan, simplified and with many advantages for applications where a rate of cooling variable with the work is desirable, is a recent field-proven development of our own engineering.



Outstanding examples of a family of fans with laid-back tips developed and produced by us in many sizes and capacities. Illustrated are 18″ diameter three blades—21″ diameter five blades—26″ diameter six blades.

We will apply the experience and skill of a lifetime of building and engineering cooling fans to your problem. We'll appreciate your inquiries.

OTHER PRODUCTS

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- AUTOMATIC SHAFT SEALS

SCHWITZER-CUMMINS COMPANY
1125 MASSACHUSETTS AVENUE
INDIANAPOLIS 7, INDIANA, U.S.A.

Welding Jet Engine Parts of Heat Resistant Metals

(*Continued from page* 41)

to a machined flange at each end. An inner cone is supported from the outer cone by tubes which are shielded from the high velocity gases by airfoil sections. These airfoil sections are constructed of a Nimonic 75 outer skin, and they are spot welded to inner spacers of 18-8 stainless. The welding of the outer skin to the inner spacers is done by a series of resistance welding process.

Since the jet pipe is peculiar to the installation of the jet engine in each particular airframe, it is designed and constructed from a variety of materials, such as 18-8 stainless steels type 347 and 321, super-stainless steels such as 19-9DL, and in one particular case of titanium. In the construction of the jet pipe, both circular and longitudinal seam welding, as well as spot welding, is utilized. Titanium jet pipes are being seam and roll-spot welded on three-phase machines, and it is interesting to note that the techniques used for welding titanium are quite similar to those used for welding stainless steels.

Materials used in jet aircraft construction include mild steel, austenitic stainless steels, martensitic stainless steels and nickel base alloys. The stainless and high nickel alloys, such as Nimonic, are characterized by their high electrical resistivity, low thermal conductivity and high tensile strength. These properties of the material affect the methods utilized in resistance welding, and govern the type of welding schedules necessary to produce high quality welds. For example, the fatigue life of a certain joint in an afterburner, which had been originally seam welded, was increased substantially by using an intermittent drive overlapping roll-spot weld, and this at an increase in welding speed.

In considering the welding parameters required for welding high heat resisting alloys, the welding force is determined by the high tensile strength of such materials and by the ability of these materials to retain their tensile strength at elevated temperatures. Thus, in comparison with the welding of mild steel, the welding force is relatively high. On the other hand, the high resistivity of the material limits the current density to a value lower than that used on mild steel and other familiar materials of better electrical conductivity. The third property that is different from the materials most commonly welded, low thermal conductivity, reveals that the weld must be maintained under the electrode force for a sufficiently long time to permit its cooling to a stable temperature, and that sufficient cooling must be provided so that the weld will reach such a temperature quickly. Low thermal conductivity also demands that sufficient cooling be provided in seam welding to achieve a uniform starting condition for each weld.

The problem of joining similar materials having different rates of thermal conductivity is frequently encountered in jet engine manufacture. In this case, a thermal balance is achieved by proper selection of electrode dimensions. In many instances, it is necessary to use two different electrode materials as well, in order to provide proper thermal balance.

Remembering the high velocity of the gases that pass through a jet engine, it is clear that electrode indentation must be kept to a minimum in order to maintain good aerodynamic surfaces. The use of variable pressure in welding aids in reducing indentation and sheet separation. Because of the unique requirements on the design of jet engines, the overlap provided for resistance welding is usually much less than what would be desired. For this reason, extreme care must be taken in the resistance welding process to avoid expulsions of material. In this respect, rigid controls must be placed on the maintenance of electrode tips to provide proper contour, so as to insure correct size of the weld nugget.

In the sheet thicknesses normally encountered in jet engines, a weld nugget of four times the sheet thickness is considered optimum. In some instances, edge distances as low as 0.060 in. have been used in production successfully; however, for ease in manufacturing, greater edge distances are preferred.

Most high heat-resistant alloys are stitch welded with a current density of 250,000 to 300,000 amp per sq in. and a force density of 25,000 to 35,000 psi.

The seam welding of high heat resistant materials from 0.020 in. to 0.064 in. may be effected by utilizing a heat time up to eight cycles with a cool time of twice the on time. Current densities to 300,000 to 350,000 amp per sq in. are utilized with pressure densities of 40,000 psi. Welding of this material in thicknesses below 0.062 in. may be accomplished satisfactorily by using a straight seam welding process. In gages above 0.062 in., it has been found advantageous to use an intermittent seam welding process.

Experience has shown that in seam welding of Nimonic material, it is very important that the number of spots per inch be maintained. In one seam welding operation the optimum number of spots per inch was found to be 15. If we increase the wheel speed to less than 15 spots per inch, we find that no weld is obtained, or if a weld is obtained, it is cracked—in some cases it is discontinuous. If the wheel speed is decreased, the welding pattern, instead of appearing normal, takes on a zig-zag appearance. This is probably due to the fact that the second weld is shunted so much by the first weld that only that corner of the weld nugget which has the least pressure density will weld. The next weld, since it is not shunted at the opposite end, will obtain higher current at this end of the weld because of the lower shunt effect, and will therefore produce a weld at this point. The next welded point will be at the opposite end and so on with the result that the pattern will have the typical zig-zag characteristic. With a slight increase in wheel speed, this shunting effect is minimized and a regular pattern will be obtained.

Willys-Overland's Latest Equipment

(*Continued from page* 40)

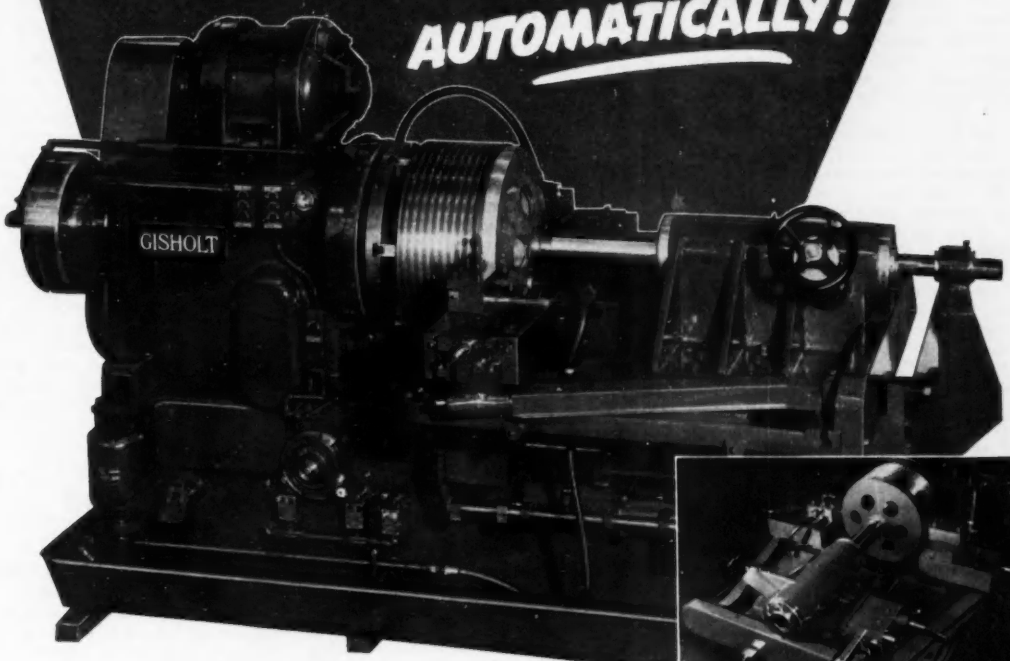
It goes without saying that the conventional chassis assembly line has no place in the assembly scheme on this passenger car line, being replaced by the "hump" conveyor described above. This procedure takes place on the second floor. As the operation is completed the bodies are transported to storage banks adjacent to the body drop which installs bodies on the final assembly conveyor located on the first floor.

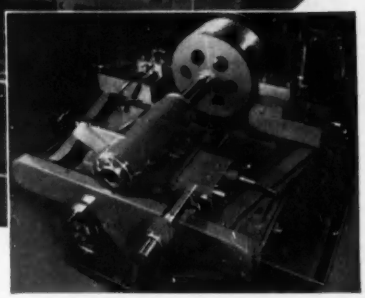
At the same time, a merry-go-round conveyor line on the second floor has been installed for producing the entire front end sheet metal assembly. As illustrated, this line has 12 framing fixtures and a developed length of some 128 ft. Sheet metal parts required for this sub-assembly are transported on a monorail feeder conveyor which links the first floor sheet metal storage with the merry-go-round line. The feeder conveyor is about 900 ft long. Following assembly, the front end unit goes to its drop opening over the first floor assembly line for installation.

AUTOMOTIVE INDUSTRIES

Keeps You Informed

How the SIMPLIMATIC machines 212 different multiple V-belt sheaves AUTOMATICALLY!





Automatic pawl fitting into notched bar sets groove position. A single tool bit on the front slide roughs, while the tool bit on the rear slide finish forms. At end of cut, table is automatically repositioned for next groove. Spindle stops and table retracts automatically at end of job.

Here's an extremely diversified job which involves 3 different sheave diameters, 3 different groove sizes—and with from 3 to 10 grooves on each sheave . . . a total of 212 different combinations! Yet the entire job is simplified to *one* machine—the Gisholt SIMPLIMATIC. The SIMPLIMATIC handles them all automatically—with various pick-off gears and face clamps. The grooves are machined progressively one at a time to avoid excessive heat and strains in the workpiece. Total machining time ranges from 2.7 minutes for the smallest to 11.5 minutes for the largest.

It's one more example of the amazing versatility of this automatic machine. Investigate the SIMPLIMATIC before you invest in a special machine.

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GISHOLT

THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

Scrap Drive Has Passed Peak

in Automobile Industry

(*Continued from page* 31)

It is estimated that scrap needs last year were 36 million tons to produce 105 million ingot tons of steel and that this year 42 million tons of scrap will be required for a total output of 118 million ingot tons.

With the scrap need acute and likely to grow worse, smaller companies in the supplier industries are to be called on for more intense efforts to get dormant scrap out of their plants. Admittedly, they do not have the manpower and organization of the larger companies, but there is considerable accumulated experience on techniques and procedures now built up, from which they can benefit.

Both Ford and Chrysler have had organized dormant scrap campaigns in effect since about last May. The Chrysler program had yielded 8460 tons up to about the end of January. This included not only the usual assortment of obsolete dies, tools, jigs, and fixtures from its own and supplier plants, but about 800 tons of metal from the complete scrappage of the old power house at the Dodge main plant in Detroit. Also included in the Chrysler contribution was a 42-ton die.

Through January 15, General Motors had turned up more than 42,500 tons of scrap through its program or the equivalent of 29,433 cars. The G.M. program has been going since about July 1, and in November was running at the rate of 10,000 tons a month. This is the weight equivalent of about 1915 military 6 x 6 trucks now being produced by G.M.

Ford started earlier with its scrap program, and through January had turned out nearly 31,000 tons of dormant scrap. Because of its steel-making facilities, Ford has been able to utilize much of the recovered scrap for its own furnaces. The company has been engaged in a modernization and rehabilitation program and consequently has been able to salvage a tremendous amount of structural steel. Some of this material goes back into new buildings or modernization, thus reducing the need for new steel, and much of it winds up in the Ford furnaces. The company also has screened very carefully its forward service requirements on replacement parts, and as a result has been able to release many dies, fixtures, tools, etc., in its own and suppliers' plants. Another unusual source of scrap at Ford, not common to other automotive companies, is the railroad at the Rouge. Many gondola and hopper rail cars unfit for further use have been scrapped for use in the openhearth and the foundry. In an operation as large as the Ford organization there are many structural components of buildings and equipment which become obsolete but which might not normally be removed. However, because of the acute scrap shortage all such items are carefully scrutinized and, if they have no further usefulness, are immediately salvaged. In addition to steel scrap, Ford also has been able to make a substantial contribution to the non-ferrous scrap drive. In one installation alone over 50,000 lb of copper cable which was no longer required was removed and sold to brass mills.

In addition to the big three, the independent automotive companies also are conducting scrap drives, but because their operations are smaller in scope, they naturally cannot contribute as greatly to the national scrap total. As the bulk of the dormant scrap is cleaned up in automotive plants, the amount collected each month naturally will taper off and if the supply of scrap is to be maintained it will require a much more widespread application of the program. It is expected that NPA will intensify its efforts to encourage smaller companies to participate in the hope that because of their greater numbers, even though individual company contributions are smaller, the aggreggate will make a significant contribution.

Another source of scrap which is just beginning to be tapped is that in automotive junk yards. The agency has issued an order limiting the number of cars that junk yards can have in inventory on March 1 to the number that each dealer has scrapped during the preceding 90 days. The objective is to encourage as high a scrapping rate as possible by March 1 in order for the dealer to build a high inventory ceiling. NPA estimates that the program could produce about two million tons of scrap in the first three months of this year.

With some steel mills living practically off the freight cars for their scrap supplies, and others down to minimum inventories of as low as two or three days, the pressure for an intensified collection is bound to increase. In fact, NPA recently told industry members attending a scrap meeting in Washington that if industry itself does not turn in enough scrap, the Government may be forced to take over scrap collections. As far as the automotive industries are concerned, they have very little to fear on that score, since they are vigorously pushing the scrap program, and it is difficult to see how any Government intervention could increase the supply. However, for smaller supplier companies that are not actively engaged in the scrap program, the possibility of Government interference is not a pleasant one. There also appears to be some difference of opinion in Washington about the advisability of a general public scrap drive. Experience in that direction during World War II was not particularly a happy one, and the public still remembers the large amounts of scrap dragged out of basements, attics, and garages, which was left uncollected for a long period or never picked up at all. There is some support for a public scrap drive which would encourage householders, farmers, small businessmen, and other individual segments of the public to collect scrap and turn it over to established dealers for orderly sorting and marketing.

AUTOMOTIVE INDUSTRIES . . .

is your News Magazine of Automotive and Aviation

MANUFACTURING

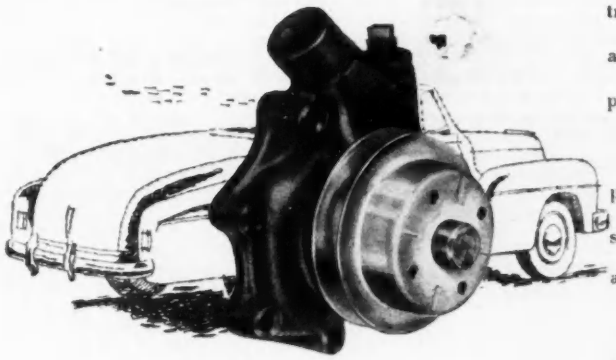
DeSoto Engine Plant

(*Continued from page* 37)

percentagewise is much less by comparison with conventional methods.

Since the chip disposal system is an integral part of materials handling in this plant, it may be of interest to touch on materials handling. We mentioned in a previous article that all materials handling at De Soto has been organized in outstanding fashion. More specifically attention is drawn to the chip conveyor lines in the cast iron department and the special endless, bucket type chip conveyors serving the two coolant settling tanks. The table reproduced with this article gives a complete summary of the conveyor system, including the length of each conveyor.

Attention is drawn to the various "free" conveyor lines noted on the table. These conveyors are used for handling crankshafts, camshafts, connecting rods, and piston assemblies. Free conveyor lines for these parts make it possible to store them at various operations where productivity per operation is lower than on other operations. It prevents clogging of moving conveyor lines and assures adequate banks of parts ahead of each setup.



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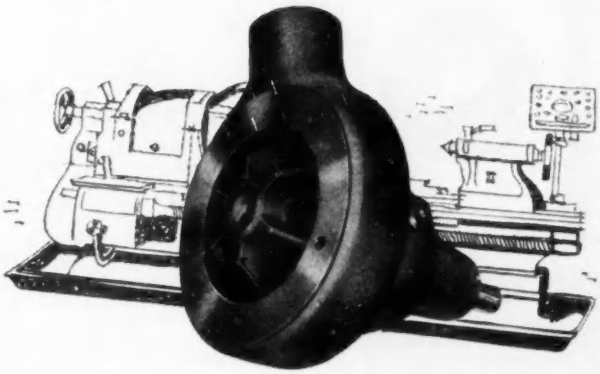

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METALS

(*Continued from page 43*)

appears quite probable that no advance in the domestic price is discernable in the foreseeable future.

Zinc Demand Less Insistent

While the zinc supply has not eased to the same degree as lead, signs of less tension are abundant and there is less scrambling for metal. The foreign premium is fast disappearing and Mexican zinc declined to 22-23 cents per lb early in February, after commanding 29-31 cents in December. Few would be surprised to see the foreign price slip to parity with a domestic ceiling of 19½ cents, particularly when the tariff is lifted.

The head of DPMA announced that 29,000 tons of zinc would be made available to industry by relieving smelters from obligation to ship this tonnage to the stockpile in the first six months of 1952. Meanwhile, mine production abroad, and to a less extent in this country, is increasing. Agreement has been made with Canada to boost zinc imports to the United States by 32,000 tons in 1952, an increase of 20 per cent over last year, and more zinc can be expected from Peru, Mexico, and Australia. This should help to keep busy the smelters which were critically short of concentrates in 1951.

Quite as important as the anticipated increase in production of zinc is the lessened demand because of cutbacks in the automobile industry. Diecasting, second only to galvanizing in the zinc industry, has felt the lessened activity evident in Detroit. Special high-grade zinc that is required for diecasting is in plentiful supply. Brass fabricators, short of copper, necessarily have curtailed their purchase of zinc until copper becomes more plentiful. This has eased the over-all demand for the metal perceptibly.

Much the same comment as was made for lead holds for its sister metal. Chances for any increase in the zinc price appear to be dim and the supply should tend to grow.

Tin Price Likely to Advance

In contrast with lead and zinc, there appears to be reason to anticipate a higher price than $1.18 per lb for tin. When RFC raised the price reluctantly in January, from $1.03 to $1.18, it left no one very happy. Bolivian producers declared flatly for $1.50 and are still holding out for a higher price. Indonesian producers also are protesting. If they are granted an increase, it would probably affect Malayan and Bolivian mines as well. Meanwhile, prospective tin supplies for the first quarter of 1952 are only 2100 tons monthly compared with normal consumption of about 5500 tons, and tin from the stockpile must be drawn upon. Under the British deal the first Malayan tin will arrive here sometime in March. The United States will get about 20,000 tons in 1952 under this agreement, but this will do little to relieve the shortage caused by the obstinate price policy instigated by the former RFC Administrator.

Steel Demand Eases

Certain steel products are rather definitely in easier supply, notably straight chrome stainless steel which has been completely decontrolled. On the other hand, high alloy steels are still in heavy demand. This is particularly true for nickel stainless steel which is expected to remain in short supply because of military requirements. Tungsten steel is easier and the demand is tapering off. The foreign price of tungsten has softened.

Steel men declare that the outlook generally is for demand and supply to be in balance before long. There will be a real loosening in the third quarter. Military demands have probably reached their peak and will not call for more than 15 per cent of present output. Consumer inventories of steel are believed to be more adequate than ad-

(*Turn to page 64, please*)

ULTRA PRECISION...

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In the manufacture of A·B·C Bushings, we use only electric furnace steel alloy containing chromium and/or tungsten. This has been our policy since the inception of the business, so there is no backlog of inferior stock or blanks to be used up • **Heat Treatment**, including quenching, is done under neutral atmosphere conditions controlled by electronic and completely automatic time clock supervision • **Recording Instruments** show entire heat treatment cycle, including both hardening and tempering temperatures • **Latest methods of inspection**, including air gauging, coupled with the most modern types of honing and grinding equipment, insure dimensional accuracy • Thus top quality steel, correct for its purpose, the last word in processing equipment and fine care exercised at each step of processing, team up to make A·B·C Bushings

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Write for catalog, price list and other information needed by the tool engineer.

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Headless Press Fit • Slip Renewable
Fixed Renewable • Head Press Fit
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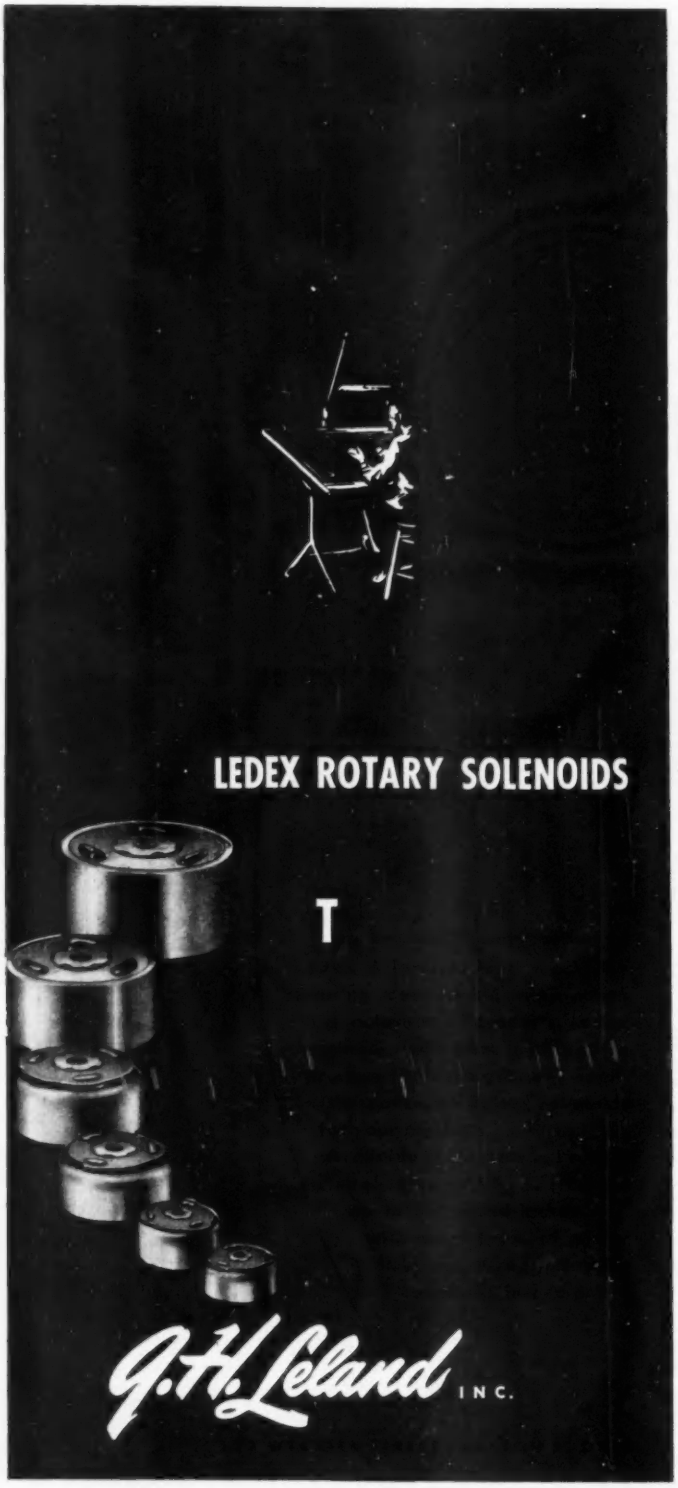


(*Continued from page 62*)

mitted. In many cases they may exceed the legal limit. Hoarding of steel has been quite widespread.

Some types of steel remain in short supply, notably plates and structural shapes. But steel men would like to see controls lifted on carbon tool steel, merchant pipe, and cold rolled sheets. Conversion steel is reported in surplus supply.

Steel mills have been operating over 100 per cent capacity for months. They have been turning out about 2,060,000 tons a week thus far in 1952. The output may drop in the months ahead because of short scrap supply and lighter demand. But any pickup in the automobile industry, now operating at subnormal rate, might change the picture. Some steel men are counting on this.

Cores for Castings Increased Six Times

(*Continued from page 27*)

last, where loose pieces are placed in location automatically for the next cycle. Core boxes are mounted on removable platens for quick changes to make various cores. Air pressure in the blower is 125 psi.

One of the biggest problems which had to be overcome in the development of this machine was that of adequate controls. Sand cores are extremely fragile and may be damaged by rough treatment. This is prevented by an indexer that operates from the station before the blow. An oil cushion is used to stop the indexer gently and without jarring the fragile cores.

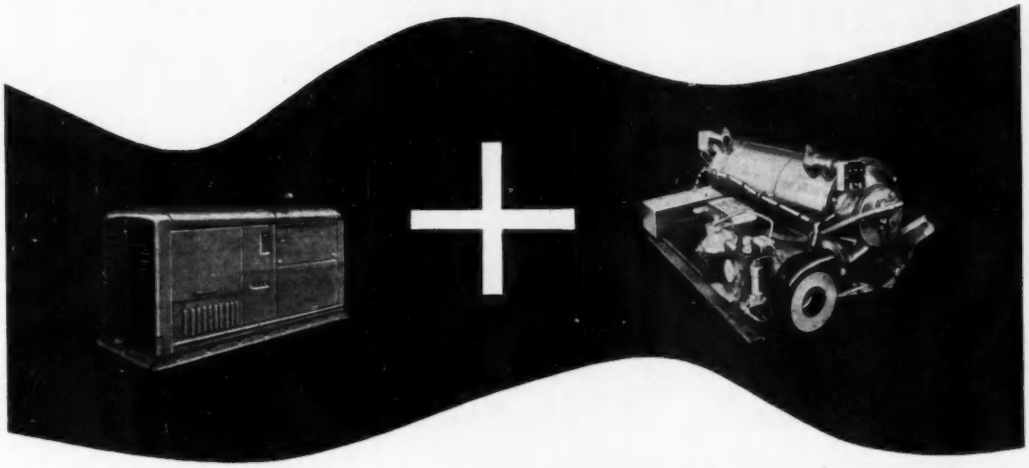
Electrical controls coordinate each separate operation, which must be done in its proper sequence, duration of each operation, and the necessary dwell between operations. The control furnishes a means of starting and stopping the machine, and for operating the turntable separately. It also furnishes a means of operating either the core blower or turntable, or the rollover drawing mechanism and turntable separately. To prevent damage to the machine, all important operations are protected by limit switches, or pressure switches. Should the control timer be improperly adjusted, or should an operation take longer than anticipated, the electrical circuit is prevented from being completed because the circuit is broken by a protecting limit switch.

Last June the first machine, designed to turn out over 240 cores per hour, was shipped to Buick. Several accessories added by Buick to the core box equipment have speeded up production to over 300 per hour. A number of other machines have since been manufactured and sold by Osborn to other automotive manufacturers.

it's always fair weather

when good diesels get together

WITH JANITROL LIQUID HEATERS



Quick, *sure* starts in any weather . . . clean, smooth operation at all times . . . longer runs between overhauls and ring replacements . . . that's basically what you get when you team up a good diesel with the time-proved Janitrol liquid heater. Five years' road experience on transit coaches have *conditioned* it for dependable, outstanding performance. On USAF vehicles like the bomber tow-tug, radar truck and fire fighting crash truck . . . on stationary diesel installations, on any job where smooth and easy starting without need for ether starts is a *must* . . . Janitrol dependability can well be valuable beyond measure. Whatever diesel-powered equipment you build, it may pay you to build year-round fair weather operation into it. Talk it over with your nearest Janitrol representative. He's a good man to know.

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Uses For Hydraulic Fluids

(*Continued from page* 50)

Temperatures may range from —90 F to 200 F or higher, light weight is important to reduce dead weight, corrossive action must be eliminated and the viscosity curve must be reasonably flat over the entire service range. Hydraulic controls are used for actuating wing flaps, for raising or lowering the landing gear, for braking the landing wheels, operating the windshield wiper, steering the nose wheel and, in pressurized cabin planes, for the cabin supercharger and the expansion turbines for cabin air-conditioning. Hydraulic fluids for aircraft work are specialty materials, and carry a premium price.

A guide to flammability of hydraulic fluids is given by the flash point of the fluid, which is the temperature at which the vapor above the heated liquid just pops into flame when an open flame is passed over the surface, and the autogenous ignition temperature, the temperature at which the liquid catches fire without contact with a flame.

In addition to the flash point and autogenous ignition temperature, several methods of evaluation that come closer to service conditions are used by the aircraft industry to study hydraulic fluids. In one of these, the fluid is squirted as a fine jet through the flame of a blowtorch, to determine flammability under conditions simulating a leak in the system. Flammability is rated against the burning under similar conditions of a standard fluid.

Hydraulic fluids are of four types, according to composition: water-base; oil-base; halogenated organic liquids; and liquid esters.

Water itself, and water-ethylene glycol mixtures, or water-methanol mixtures are used for water-base fluids. Ethylene glycol or methanol are added to lower the freezing point of the fluid where temperatures below the freezing point of water may be encountered. Fluids in this group are the lowest in cost, are fire-safe under most conditions (mixtures high in methanol or ethylene glycol may yield flammable vapors), have poor lubricity, and tend to rust iron.

Oil-base fluids are probably the most widely used of any hydraulic fluids, as the oils may be adjusted to a wide range of viscosities, are low in cost, are noncorrosive to most metals and to many gasket materials, do not freeze, have acceptable lubricity, and may be given a degree of fire resistance by addition of "snuffers" to the fluid. Autogenous ignition temperature of most oils is of the order of 500 F, and this is the most serious drawback of the materials for some applications. By adding fire-resistant chemicals—snuffers—this temperature can be increased considerably. Oil-base fluids are used in the hydraulic brake systems of automobiles and trucks, in machine tools, clamping systems on welding equipment, etc.

Halogenated organic liquids are fire-resistant, have fair lubricity, cost five or six times as much as the petroleum-base liquids, usually have flat viscosity curves, and may be chosen for either high-temperature or low-temperature service. Many of these liquids emit irritating fumes at elevated temperatures, which, while not a problem in a properly sealed system, present a danger in event of breakage. Chemically, the liquids are chlorinated phenols, hexachlororbutadiene, chloro - fluorochemicals, etc. They are used in die casting machines, in certain types of military items, etc.

Liquid esters are usually phosphates or silicates of organic radicals. They have a good range of service temperatures, good lubricity, are fire-resistant, and may cost from four to twelve times as much as petroleum fluids. Most of them do not give off irritating fumes at elevated temperatures. They are widely used in die casting machines, and in aircraft.

NEW! MITCHELL IGNITION SWITCH

Cutaway view of new Mitchell ignition switch showing die cast detent path and operating mechanism.

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United Specialties' Mitchell Division, pioneer of the starter-type ignition switch combining starter circuit and ignition switch functions, now offers a new, improved starter-ignition switch. Check these advantages:

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CALENDAR

OF COMING SHOWS AND MEETINGS

Amsterdam Automobile Show, Amsterdam, Netherlands ..Feb. 29-Mar. 10

ASTM Spring Meeting, Cleveland, Ohio .....Mar. 3-7

SAE Passenger Car, Body and Materials Meetings, Detroit, Mich. ..Mar. 4-6

Fifth National Plastics Exposition, Phila., Pa. .....Mar. 11-14

ASTE Industrial Exposition, Chicago, Ill. .....Mar. 17-21

Geneva Automobile & Truck Show, Geneva, Switzerland .....Mar. 20-30

Chicago International Trade Fair, Chicago, Ill. .....Mar. 22—Apr. 6

First Annual American Power Conference, Chicago, Ill. .....Mar. 26-28

American Society of Lubrication Engineers, Seventh Annual Meeting and Lubrication Show, Cleveland, Ohio .....Apr. 7, 8, 9

SAE Aeronautic Meeting, New York, N. Y. .....Apr. 21-24

Turin Automobile Show, Turin, Italy .....Apr. 23-May 4

Fifth Annual Hot Rod and Motor Sports Show, Los Angeles, Calif. Apr. 24-27

Metal Powder Show and Eighth Annual Meeting, Chicago, Ill...Apr. 29-30

International Foundry Congress and Show, Atlantic City, N. J. ...May 1-7

API Div. of Refining, San Francisco, Calif. .....May 12-15

Society of Experimental Stress Analysis, Spring Meeting, Indianapolis, Ind. .....May 14-16

American Society for Quality Control (sixth annual meeting), Syracuse, N. Y. .....May 22-24

Memorial Day 500 Mile Race, Indianapolis, Ind. .....May 30

SAE Summer Meeting, Atlantic City, N. J. .....June 1-6

Third Annual Conference on Industrial Research, Columbia Univ., New York, N. Y. .....June 9-13

National Truck, Trailer and Equipment Show, Los Angeles, Calif. June 12-15

Industrial Finishing Exposition, Chicago, Ill. .....June 16-20

American Society for Testing Materials (annual meeting), New York City .....June 23-27

SAE West Coast Meeting, San Francisco, Calif. .....Aug. 11-12

American Standards Asso., Third National Standardization Conference, Chicago, Ill. .....Sept. 8-10

Instrument Society of America (sixth annual meeting), Cleveland, Ohio .....Sept. 8-12

SAE Tractor Meeting, Milwaukee, Wis. .....Sept. 9-11

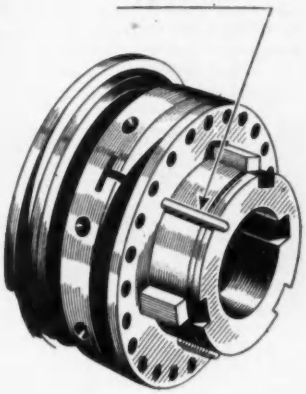
Paris Automobile Show, Paris, France Oct. 2-12

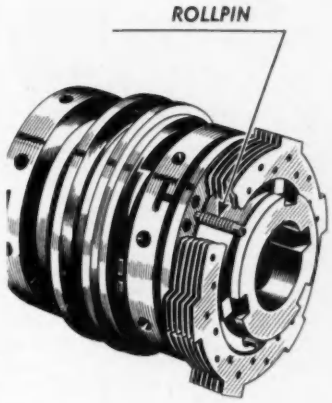
37th International Motor Exhibition, London, England .....Oct. 16-22

Fastener Problem of the Month

Economical Location of Release Springs — **March 1952**

PROBLEM: Release springs in precision-built machine tool clutches must be mounted on pins, to hold them in proper position and to insure that they clear all of the clutch plates. The Twin Disc Clutch Company, Racine, Wisconsin, formerly used solid pins to locate these release springs, but were searching for a faster, more economical assembly.





SOLUTION: Rollpins, the pressed-fit pins with chamfered ends, were suggested by ESNA—and Twin Disc engineers were quick to realize their advantages. Rollpins, simply driven into the pressure rings, eliminate the reaming operation necessary in the former assembly. Rollpins are held firmly in place by the constant pressure they exert against the hole walls . . . provide a straight guide for the springs. Assembly is faster and cheaper, performance surer, and field service simplified.

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Dept. R2-35

ELASTIC STOP NUT CORPORATION OF AMERICA

2330 VAUXHALL ROAD, UNION, NEW JERSEY.

Name .....Title .....

Firm .....City .....

Address .....Zone ..... State .....

ROLLPINS . . . a variety of lengths and diameters.

Gear Tooth Cutting Time Reduced

(*Continued from page 42*)

and electrical control functions.

Broaching of the teeth is accomplished by a combination of indexing and shuttle movement of the fixture that encircles the machine. In operation, the fixture first moves into cutting position under an 11-tooth, 12-segment surface broach nine in. wide by 60 in. long. After the broach has been passed through the work, the fixture moves out of cutting position and the broach is returned to the top of its stroke. Shuttle movement is accomplished through a hydraulically controlled locking cam action.

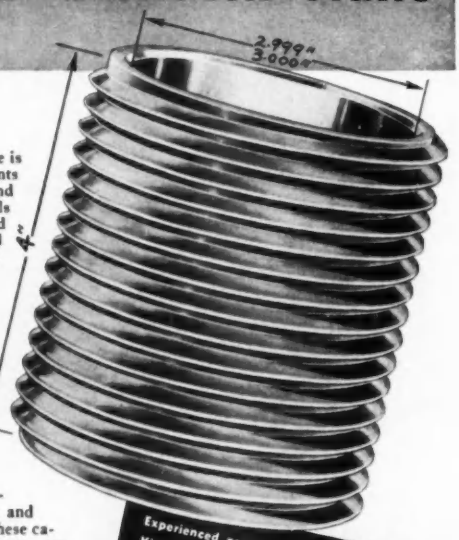
Indexing of the turret ring to the next cutting position also is accomplished by hydraulic cylinders. These rotate the part in the fixture to the next position where a hydraulically-controlled index pin locks the fixture in accurate indexing location. The turret ring is clamped in the fixture by hand clamps and is ejected hydraulically for unloading. The machine currently operates on a semi-automatic cycle in which the indexing function is controlled independent of the machine operation.

Teeth formed by the broaching operation are checked while the part is still in the machine. The gage that checks the part both for tooth spacing and size is integral with the index fixture and passes through the column of the machine.

The turret ring gear has 294 teeth of 4 pitch and 1.385 in. face width. Pressure angle is 25 deg and depth 0.525 in. Pitch diameter of the gear is 73.5 in. The teeth are held to a tolerance of 0.001 in. spacing by the broaching operation.

To produce the part to these tolerances required high precision in machining the fixture. Eccentricity on the assembled fixture is less than 0.0005 in. per ft of diameter.

Expertly machined HARDENED & GROUND PARTS



THE sleeve shown here is a large piece and represents an exacting job—the kind we handle well. It calls for accurately hobbed threads over the full length . . . a polish-ground bore concentric with the pitch diameter of the threads . . . tolerances that challenge our ingenuity and skill.

Brown Hardened and Ground Parts have served the automotive industry for more than 40 years. In that time we've gained invaluable experience in precision machining, scientifically-controlled heat treating and micro-finish grinding. These capable facilities are at your command. Merely send us your prints; write or wire your requirements.

Henry W. Brown
PRESIDENT

Experienced production on . . .
King Pins • Shackle Bolts • Shackle Pins
Brake Anchor Bolts • Countershafts
Idler Shafts • Stub Axle Shafts
Steering Ball Bolts
Beam Balls and Bolts
5th Wheel Rocker Shafts • Wheel Studs
Water Pump Shafts
. . . anything in the hardened and ground line, of any analysis steel, up to 4¼" diameter.

THE BROWN CORP.
213 BELLEVUE AVE. SYRACUSE, N. Y.
C. H. Ehlert, 3407 Clarendon Rd., Cleveland • N. F. Spring, 4716 Balfour Rd., Detroit • R. C. Sanderson, 5008 N. Clark St., Chicago • Harry J. Windmiller, 1704 Carlton, Fort Worth • Johns William & Co., 1440 N. Spring St., Los Angeles, Calif. • John B. Hunt, 5611 S.E. Yamhill St., Portland, Ore.

Caterpillar Sales Set Record During 1951

Caterpillar Tractor Co. recently announced that it again achieved record sales during 1951, a total of $393,756,098. Previous record sales amounted to $337,285,327 during 1950, with a profit of $29,264,285. The latter figure overshadowed a profit of $15,732,141 during 1951. As a percentage of sales, the profit declined from 8.68 per cent during 1950 down to 4 per cent during 1951.

Firestone Sales, Profits Hit Record High in 1951

According to its recent annual report, Firestone Tire & Rubber Co. for the fiscal year ended Oct. 31, 1951, had the highest sales and profits in its history. Net sales amounted to $975,766,455 compared with $690,571,555 for 1950, an increase of 41 per cent. Net income amounted to $48,398,950 compared with $33,267,561 for 1950.

Construction Contracts Let at Chevrolet Defense Plant

It was recently announced that general construction contracts for completion of the 1 million sq-ft Chevrolet defense plant expansion at Tonawanda, N. Y., have been let. Several buildings are included, all assigned to Chevrolet's biggest defense contract, production of two Wright R-3350 aviation engines for the Air Force and Navy.

Elect Grace as TTMA Leader

At its recent 11th annual convention, William E. Grace was elected president of the Truck-Trailer Manufacturers Association. He is executive vice president and general manager of Hobbs Manufacturing Co.

Publications

(*Continued from page* 49)

H-56 Precision Machines for Defense Work

Ex-Cell-O Corp.—Vol. 27, No. 1 of Tool Tips contains interesting items concerning the firm's machine tools being used for defense production. The Ex-Cell-O Style 87 precision profile grinder, used for jet blade production, is featured in one article.

H-57 Machine Tools for Mass Production

Bullard Co.—A booklet which the company originally published in 1928 is being made available. It covers the Mult-Au-Matic method for boring, turning, facing, drilling, reaming, threading, grooving, etc. Of interest is that the book is just as applicable today for mass production as it was when originally published.

H-58 Magnetic Gages

Pratt & Whitney, Div. Niles-Bement-Pond Co.—Just released is an eight-page booklet on continuous gaging with P&W Magnetic gages. Various gages and accessories are illustrated and described.

H-59 Diamond Wheels

Norton Co.—How to make diamond wheels last longer is the theme of a recently issued booklet. The do's and don't's point out some of the rules and precautions to observe and wasteful practices to avoid when using diamond wheels for grinding carbide tools.

H-60 Products and Services

Bendix Aviation Corp.—The products and services offered by the company to the automotive and allied industries are explained in a booklet, "Bendix Aviation Corp. and Your Business."

Observations

(*Continued from page* 44)

Actually there are a lot of Pitmans but apparently none of them had a hand in naming the steering gear arm. AMA researchers found the origin in a copy of Knight's American Mechanical Dictionary (1882) which defines a pitman as the rod connecting a rotary shaft with a reciprocating object such as the connection between the steam piston of a locomotive and the crank. Its origin, however, goes back to lumbering when a two-man team used a saw for cutting big logs. One man worked above, the other was in a pit below the log and worked the lower end of the saw. The low man (on the totem pole) was the pit-man.

FOR
OLD TIME VALUES
IN
MODERN
HANDLING
EQUIPMENT
You've got to
Buy CLARK

★

MOTOR—Designed for **CLARK** for the specific power requirements of industrial use. Fuses protect both motor and circuits against damage.

★

STEERING AXLE—Pivoted—all four wheels **always** on the ground: better traction, better steering, utmost stability.

★

DRIVE AXLE BY CLARK—Regular Hiway-Truck-Type Clark axle—the best that can be said of any axle.

★

AUTOMATIC ACCELERATION as employed on **CLARK** Electrics takes out the human error—**no jerking**—

★

DIRECTIONAL LEVER on **STEERING COLUMN**—greatly simplifies operation, increases maneuvering speed and fast getaway.

★

BRAKES—HYDRAULIC—Smooth, positive action for safe operation—ruggedly built for long-lived efficiency.

To meet the varying needs of users, CLARK electric fork-truck motors are designed to operate efficiently on any power supply from 30 to 48 volts. CLARK'S standard power supply is 36 volts. These trucks are designed with perfect balance among all components and incorporate a new method of motor winding which provides more efficiency than has ever been offered in an industrial truck motor . . . There have been many technical changes from year to year in CLARK machines, but there has never been any change in CLARK'S 30-year purpose to give you the best VALUE your money can buy—and there never will be.

CLARK ELECTRIC AND GAS POWERED FORK TRUCKS
AND POWERED HAND TRUCKS • INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIVISION • CLARK EQUIPMENT COMPANY • BATTLE CREEK 68, MICHIGAN
Please send: ☐ Material Handling News ☐ Condensed Catalog ☐ Basic Facts Book. ☐ Have Representative Call.
Name_____
Firm Name_____
Street_____
City_____ Zone____ State_____
AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

Industry News

(*Continued from page* 18)

Borg-Warner Establishes a Products Development Div.

Borg-Warner Corp. has announced the establishment of a Products Development Laboratory, in Detroit, Mich., as a separate division to carry both defense and civilian items from the invention stage to actual production.

The development of new products for military use and the improvement of automatic transmissions are projects being given top priority by a staff of more than 50 engineers, designers, and other technicians, headed by David T. Sickelsteel, newly appointed general manager of the laboratory. He previously was vice president in charge of engineering with the Detroit Gear Div. of Borg-Warner.

The laboratory, which occupies 20,000 sq ft of floor space, has been equipped with electric and gas-driven dynamometers and other testing devices, as well as with modern machine shops. A special fleet of passenger cars and trucks is available for the road-testing of transmissions, torque converters, transfer cases, and other automobile equipment under development in the laboratory.

12,500 Retire in Two Years Under Automobile Pensions

Since pension plans in the automobile industry went into effect March 1, 1950, approximately 12,500 United Auto Workers members have retired on pensions as of the beginning of this year, according to a survey made by UAW-CIO. The Ford pension program was the first to go into effect, and that company has had the most retirements to date with 4930 pensioners. General Motors Corp. was second with 2940 and Chrysler, third, with 651. Ford of Canada has retired 218 workers, and 192 have been pensioned from GM operations in Canada.

A union survey shows further that 94.5 per cent of the 12,500 retirements were at or after age 65. Total and permanent disability retirements totaled 4.1 per cent, and early retirements (between the ages of 60 and 65 for reasons other than disability) accounted for 1.4 per cent. Thus far Ford is the only major company which has put automatic retirement provisions into effect.

Steel Plant Expansion Set Record Last Year

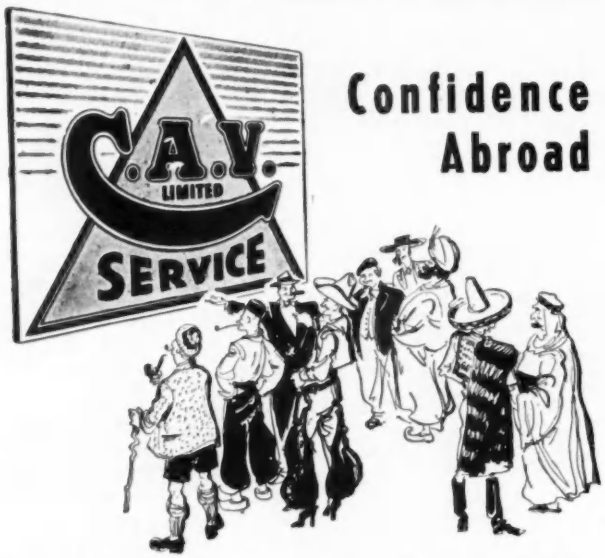
Steel companies spent more than $1 billion for expansion last year, according to the American Iron & Steel Institute. Expenditures for new equipment and construction were at an all-time high and exceeded 1950 outlays by 103 per cent.

The Institute also reports that this year the steel industry will spend an estimated $1.3 billion and that by the end of 1952 capital outlay since 1946 will be more than $4.7 billion, or about 70 per cent of the steel industry's estimated total investment at the start of 1951. Steel-producing capacity last year was increased by more than 4.3 million tons.

Reynolds Metals Plans New Aluminum Plant

Reynolds Metals Co. is planning to build a new aluminum plant with an annual capacity of 55,000 tons of pig aluminum at Gum Springs, Ark. Cost of the new plant, which will include a pot room ¼ mile long, is estimated at $30 million. The plant is expected to be in operation by the first of next year.

The company also is planning a $2 million expansion of its facilities at Lister Hill, Ala., including construction of an aluminum rod mill with approximately 100,000 sq ft of floor space. It is expected to be completed by July.

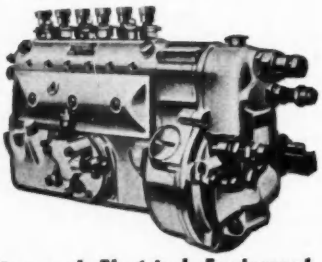


Confidence Abroad

Transport operators all over the world have learnt to trust this sign.

In any language the letters on the C.A.V. sign stand for first-rate service facilities, maintained by highly-trained craftsmen, using special precision equipment.

Wherever vehicles fitted with C.A.V. Fuel Injection Equipment are exported — whether to Trondheim, Santiago, Hong-Kong or Sydney — there's a service agent or depot to give it the specialist attention needed for such high-precision equipment.



C.A.V. **Fuel Injection and Electrical Equipment**

Service Depots throughout the World

C.A.V. DIVISION OF LUCAS ELECTRICAL SERVICES INC., NEW YORK 19, N.Y. Sales Office: 14820 DETROIT AVE., CLEVELAND 7, OHIO

174-344B

Large Cuban Nickel Plant Goes Back in Production

According to a recent announcement by the General Services Administration, the Nicaro nickel plant, located in Oriente Province, Cuba, and said to be one of the world's largest, is back in production. Four of the plants 12 huge Herreshoff furnaces are reported to be working 24 hours a day. Each allegedly has a capacity of over 20,000 lb of nickel a month. The other eight are scheduled to be brought into operation during the next four months. The plant will then be producing nickel at the rate of approximately 30 million lb a year.

Nickel oxide, a granular substance, is the plant's final product, rather than molten metal. The oxide is said to contain approximately 75 per cent metallic nickel and can be used directly in steel alloys to give increased strength and toughness.

Atomic Energy Used to Study Wear on Auto Piston Rings

Although atomic power for industrial use is still in the long-term future, atomic energy is now being used in such diverse jobs as studying plant growth and measuring wear on automobile piston rings, according to Harry A. Winne, vice-president of engineering, General Electric Co. He also said that atomic energy is being used to detect impediments in pipelines, to aid in determing how metals corrode, and to help in the search for better metals for aircraft gas turbines.

Mr. Winne stated that wear on piston rings was measured by an oil company, which wanted to test the effectiveness of cylinder lubricants. The rings themselves were exposed to atomic rays, and so became radioactive. After they had been used on very short runs, the wear could be determined by measuring the radioactivity that had gotten into the oil.

AAMA Show Draws Large Attendance

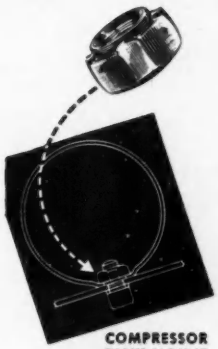
More than $1 million worth of exhibits were displayed in 575 booths at the recent 25th annual exhibition of the Automotive Accessories Manufacturers of America, held in New York, N. Y. The show, which was restricted to the trade, is estimated to have attracted about 7000 buyers.

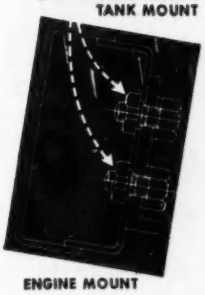
White Awarded Two Big Subcontracts

White Motor Co. has announced the award of two defense production subcontracts, estimated to be worth $20 million, to bring the firm's total defense backlog to nearly $40 million. Under a subcontract with Western Electric Co., White will build bodies

(Turn page please)

MIDLAND
WELDING NUTS





● Welded to inside spots, where it is difficult or impossible for hands or tools to reach, MIDLAND WELDING NUTS hold fast while bolts are turned into them.

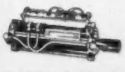
This method speeds up the assembly of metal stampings, and helps spread the use of manpower. Midland Welding Nuts enable one man to do the work formerly requiring two, while one worker held old style nuts from turning.

Investigate the need for Midland Welding Nuts in your plant. Write or phone for complete information.

The MIDLAND
STEEL PRODUCTS COMPANY
6660 Mt. Elliott Ave • Detroit 11, Mich
Export Department 28 Pearl Street, New York, N. Y.

World's Largest Manufacturer of
AUTOMOBILE and TRUCK FRAMES

Air and Vacuum
POWER BRAKES



Air and
Electro-Pneumatic
DOOR CONTROLS

for a fire-control truck to be used by Army Ordnance.

The second subcontract, with Beech Aircraft Corp., is for wing assemblies for the T-36A trainer plane. Fulfillment of the two defense orders is not expected to interfere with the company's normal production of buses.

Clark Sales for 1951 Show a Sharp Rise

In its recent preliminary annual report, Clark Equipment Co. stated that sales of $130 million in 1951 represented an increase of 91 per cent over those in 1950. Earnings, however, showed a gain of only 10 per cent, or $7.84 a common share, compared with $7.10 a share in 1950. Net income was $5,277,000.

Reo Turns Out 200 Engines Per Day

According to company officials, Reo Motors is now producing 200 Gold Comet gasoline engines a day, and this figure is expected to increase. In that event, it is anticipated that production facilities may be expanded.

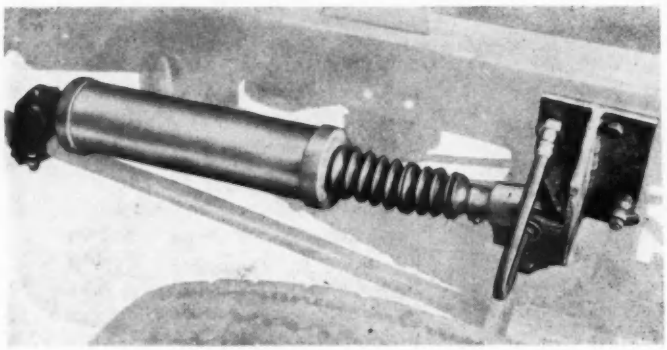
Navy Viking Rocket to Try for New Altitude Record

The Naval Research Laboratory and Glenn L. Martin Co. recently announced that another assault on the world's altitude record for single-stage rockets will be made next spring by a Navy Martin Viking. The forthcoming rocket will, however, be greater in diameter, slightly shorter, and have smaller fins than its predecessors.

This new size will allow considerably more fuel (liquid oxygen and alcohol) to be carried. The power plant will still be made by Reaction Motors, Inc., and will generate approximately 20,000 lb of thrust.

Ford Pays $1 Million for Workers' Ideas

Ford Motor Co. has paid more than $1 million to its employees for suggestions aimed at improving production or quality, or cutting costs, since its program was established in 1947. A total of 85,228 ideas have been submitted by employees, of which 23,326 have been accepted for trial, and awards have averaged $52.53.



Air-O-Matic Power Steer Booster installed on White Truck Model 302264

AIR-O-MATIC *AIR POWER STEERING*

for

SAFE STEERING ASSIST

A self-contained unit, easily installed. Only one air line required.

Low initial cost and maintenance.

Used by manufacturers of trucks, tractors, Moto-Cranes, off-the-road equipment, Military and other vehicles.

Technical information furnished upon request

AIR-O-MATIC POWER STEER CORP.

24 Noble Court N. W. Cleveland 13, Ohio

Armed Forces Outlays Continue to Increase

The Army, Navy, and Air Force are reported to be well on their way toward spending the $49.7 billion available for contract obligation in the procurement and construction fields during fiscal 1952. From July through Dec., 1951, the defense agencies obligated $18 billion for buying of major equipment and supplies for military construction, and for plant expansion. The Air Force led the way with $7.6 billion, followed by the Navy with $5.5 billion, and the Army with $4.9 billion.

Procurement of "hard goods," including aircraft, ships, and tanks, required an obligation of $15.2 billion. Funds for clothing, subsistence, and petroleum amounted to $1.9 billion, while construction cost $900 million. The figure for hard goods includes $800 million to buy materials for use in the Mutual Security Assistance program.

British Car Allotments for Domestic Use Cut

The British public will be allowed to purchase only 60,000 cars and the same number of commercial vehicles during 1952. This compares with 110,000 passenger cars and 100,000 commercial vehicles placed at the disposal of home users last year. It is assumed that the balance of 50,000 passenger cars and 40,000 trucks will go to export. However, if exports cannot be increased, it may be necessary to reduce output so that resources could be transferred to other products which could be sold overseas. The Society of Motor Manufacturers & Traders holds the opinion that production will drop 20 per cent during the year.

U. S.-Canada Cooperate in F-86 Production

The U. S., Britain, and Canada are reported to have completed arrangements for the pooling of resources to build and man several hundred F-86 Sabrejet fighter planes for Atlantic Pact forces. Under the plan, Canada will build aircraft frames at Canadair, Ltd., while the U. S. will furnish engines and other equipment. The planes will then be shipped to Britain to be manned by Royal Air Force Personnel.

More Defense Contracts Placed in Dayton Area

Additional Government defense contracts exceeding $2,325,000 have been awarded to firms in the Dayton, O., area. Among the recipients were: Dayton Aircraft Products—$195,000 for Navy bomb rack points and Air Force photo equipment; General Motors Corp. —over $250,000 for Air Force propeller blade equipment; Baldwin-Lima-Hamilton Corp.—$105,000 for Diesel engine parts; and Armco Steel Corp.—over $250,000 for steel discs.

WASHINGTON CHECKERBOARD

Complete texts of Government agency regulations described briefly in this column may be obtained by writing the Information Div. of the agency concerned, Washington 25, D. C.

National Production Authority

Iron and Steel (Order M-1 Amended, Dir. 1, 2, 3, 4, revoked)—announces that production of iron and steel henceforth will be regulated entirely by directives, or by production schedules authorized in connection with approved CMP 4-B applications.

Aircraft Quality Steel (Amdt. 1 to Sch. 1, M-6A)—adds two types of engines (gas turbine or aircraft-type internal combustion engines for use in naval vessels) to the list of military items for which steel distributors are required to earmark aircraft quality alloy steel.

Personnel—J. J. Demuth, president of the American Society of Tool Engineers, has been appointed chief of the Tool, Die, Jig, and Fixture Section, Metalworking Equipment Div.; and **David T. Marvel**, sales manager, Metals Div., Olin Industries, has been named deputy assistant administrator of the Metals and Minerals Bureau.

Office of Price Stabilization

Plymouth Dodge, De Soto, and Chrysler Passenger Automobiles (CPR 83, Sec. 2, SO 14)—authorizes increased basic retail dollars-and-cents prices for 1952 models of Chrysler Corp. passenger automobiles and for factory-installed extra, special, or optional equipment.

Mechanical Precision Springs, Metal Stampings and Screw Machine Products (CPR 119, Amdt. 1-Miscellaneous Amendments)—authorizes manufacturers covered by CPR 119 to elect to use ceiling prices established under the machinery manufacturers' price regulation (CPR 30).

Iron and Steel Scrap (CPR 5, Amdt. 7)—announces modification of restriction on use for certain electric furnace and foundry grades.

Defense Production Administration

Revision of Tax Amortization Regulations (DPA-247)—announces revised regulations governing the issuance of certificates of necessity for rapid tax amortization that become effective March 1.

U. S. Department of Commerce, Office of International Trade

Aluminum, Zinc, Tungsten Export Quotas (OIT-941)—establishes first-quarter export quotas for certain types of these products.

Mobilization Chief to Address ASTE

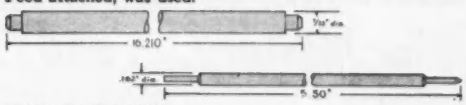
Charles E. Wilson, director of Defense Mobilization, is scheduled to speak March 20 at the American Society of Tool Engineers annual banquet during the society's convention in Chicago, Ill., March 17 to 21. The subject of his talk has not been revealed, other than it will be a major address of national importance to industry.

LIPE *Automatic* Magazine Loading BAR FEED

Averages Net Gain of 78% in running time!

Another Record

THE JOB . . . At L. C. Smith & Corona typewriter plant, Syracuse, N. Y., such operations as cut-off, chamfering, shaping ends, knurling were done on 14 different jobs, ranging in length from 5¼" to 16¼". A Model 00 B & S Screw Machine having a Lipe Automatic Magazine Loading Bar Feed attached, was used.



THE RESULTS . . . On running time alone, a net gain of 78% was averaged over the 14 separate jobs. And that's not all! A minimum of 30% was also gained in production because the screw machine does not "cut air" when it is left running unattended by the operator. Therefore, the overall result on these widely varied jobs is an average increase in total production of 108%.

BIG Production Gains

on a great variety of work Because . . .

- *Stock is fed to screw machine all the time—not dependent on operator.*
- *Feed-out pressure always behind stock.*
- *Eliminates feed fingers.*
- *Avoids multiple feed finger feed-outs.*
- *Model AML gives maximum output of machine — no "cutting air."*
- *Saves in changeover set-up time.*

Upon request we will be glad to send you a time chart showing the separate savings of the 14 jobs referred to in the case history above. Get full details on how this machine will increase production and save you money. It's today's big advancement in screw machine stock feeding. Our engineers are glad to study your problem. No obligation.

LIPE ROLLWAY

Lipe - ROLLWAY CORPORATION

Syracuse 1, N. Y.

How Can America Produce All the Steel It Needs . . . for Military . . . and Civilian Purposes?

FREE BOOKLET Tells How to Conduct Scrap Salvage Program in *Your* Business.

Address Advertising Council, 25 W. 45th St., New York 19, N. Y.

One way is to feed more pig iron into the furnaces. But . . .

That will require *more* supplies of ore, limestone, coal, etc.*—to say nothing of more new ore boats and rail cars to transport the additional supplies.

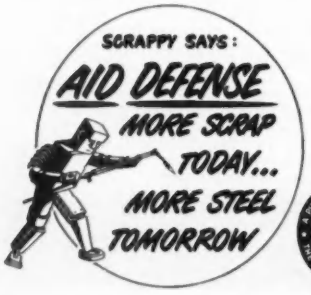
A better way—the *only* practical way—is to use the *dormant* iron and steel scrap lying around in the form of old machines, equipment, tools and metal structures.

Your business *must* have available scrap—in *some* form. That scrap is *needed* to keep the furnaces going in the steel mills . . . to keep our fighting forces and our allies well armed . . . to sustain our civilian life at home.

Think how many ways *you* use iron and steel. Think what would happen if it became extremely scarce. Put your iron and steel scrap to good use—now—by selling it to your local scrap dealer.

Don't delay—the emergency is becoming more severe every day.

*For every ton of scrap fed into the furnaces, we save approximately 2 tons of iron ore, 1 ton of coal, nearly ½ ton of limestone and many other critical materials. Also, scrap helps make steel faster, shortens the refining process.



NON-FERROUS SCRAP IS NEEDED, TOO!

This advertisement is a contribution, in the national interest, by

Automotive Industries

MEN *in the* NEWS

(*Continued from page* 19)

Minnesota Mining and Manufacturing Co., Coated Abrasives Div.—**S. L. Johnson** has been made manager of the New Methods Development section.

Calumet & Hecla Consolidated Copper Co., Inc., Wolverine Tube Div.—**George D. Potter** has been appointed director of sales, while **John M. Dumser** succeeds him as general sales manager. **L. G. Fox** has been made manager of sales service, and **S. C. Seekell** has been promoted to manager of wholesaler sales.

Boeing Airplane Co., Wichita Div.—**Al Hill** has been named public relations manager. **Gordon Williams** succeeds him as news bureau manager at Seattle, Wash.

Ryan Aeronautical Co.—**Oliver M. Merrill** has been chosen administrative engineer.

Barnes Drill Co., Inc.—**W. M. Fairbairn** has been named chairman, while **Reed M. Andress** has been made president and general manager.

Bell Aircraft Corp.—**Leston Faneuf** has been promoted to assistant general manager.

Warner Electric Brake & Clutch Co.—**Steven P. J. Wood** has been elected executive vice president.

Lear, Inc.—**George K. Otis** has been elected a vice president.

Redmond Co., Inc.—**James J. Griffin** has been chosen to handle special accounts of series motor sales in the Detroit, Mich., area. **Lee Smith** has been assigned to the service and replacement market program. **Scott Sample** has been assigned the eastern area of the country and Canada on series motor sales, while **Ward Brigham** will handle western area sales.

Cummins Engine Co., Inc.—**E. D. Tull** has been appointed vice president for personnel and plant.

Texas Engineering and Manufacturing Co., Inc.—**Herman Muller** has been named assistant superintendent in charge of night operations.

Ford Motor Co.—**John B. Kendall** has been appointed manager of the Buffalo, N. Y., plant.

Yale & Towne Manufacturing Co., Philadelphia Div.—**Roy A. Duffus, Jr.,** has been named publicity manager.

Ford Motor Co. of Canada, Ltd.—**Allan S. Harrison** has been appointed director of purchasing.

Willys-Overland Motors, Inc., Contract Administration Div.—**William S. Pickett** has been chosen director.

American Machine and Foundry Co., General Products Div.—**James A. Nelson** has been made manufacturing assistant to the vice-president and general manager.

Homestead Valve Manufacturing Co.—**Don H. Krey** has been appointed appointed vice-president in charge of sales, while **John W. Force** has been made vice-president in charge of engineering.

Willard Storage Battery Co., Eastern Div.—**L. P. McCarthy** has been appointed manager of manufacturers sales.

Fairchild Engine and Airplane Corp.—**Admiral John H. Towers** has been elected a member of the board.

American Wheelabrator & Equipment Corp.—**Andrew B. Stevens** has been promoted to assistant factory manager.

AirResearch Manufacturing Co.—**Richard E. Palmer** has been named assistant to the sales manager.

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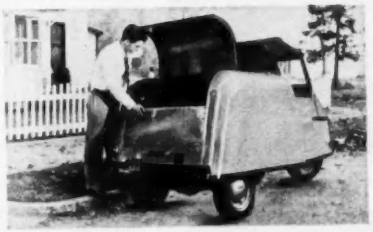

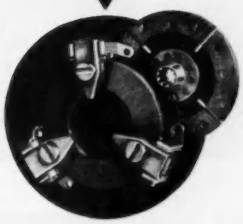

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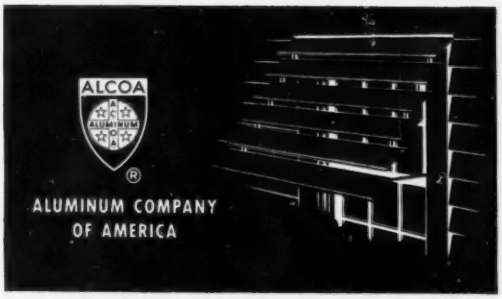

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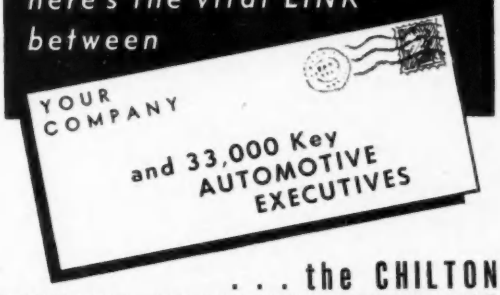

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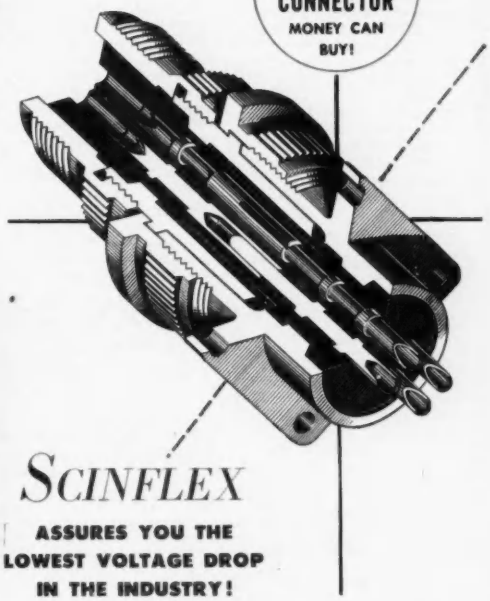

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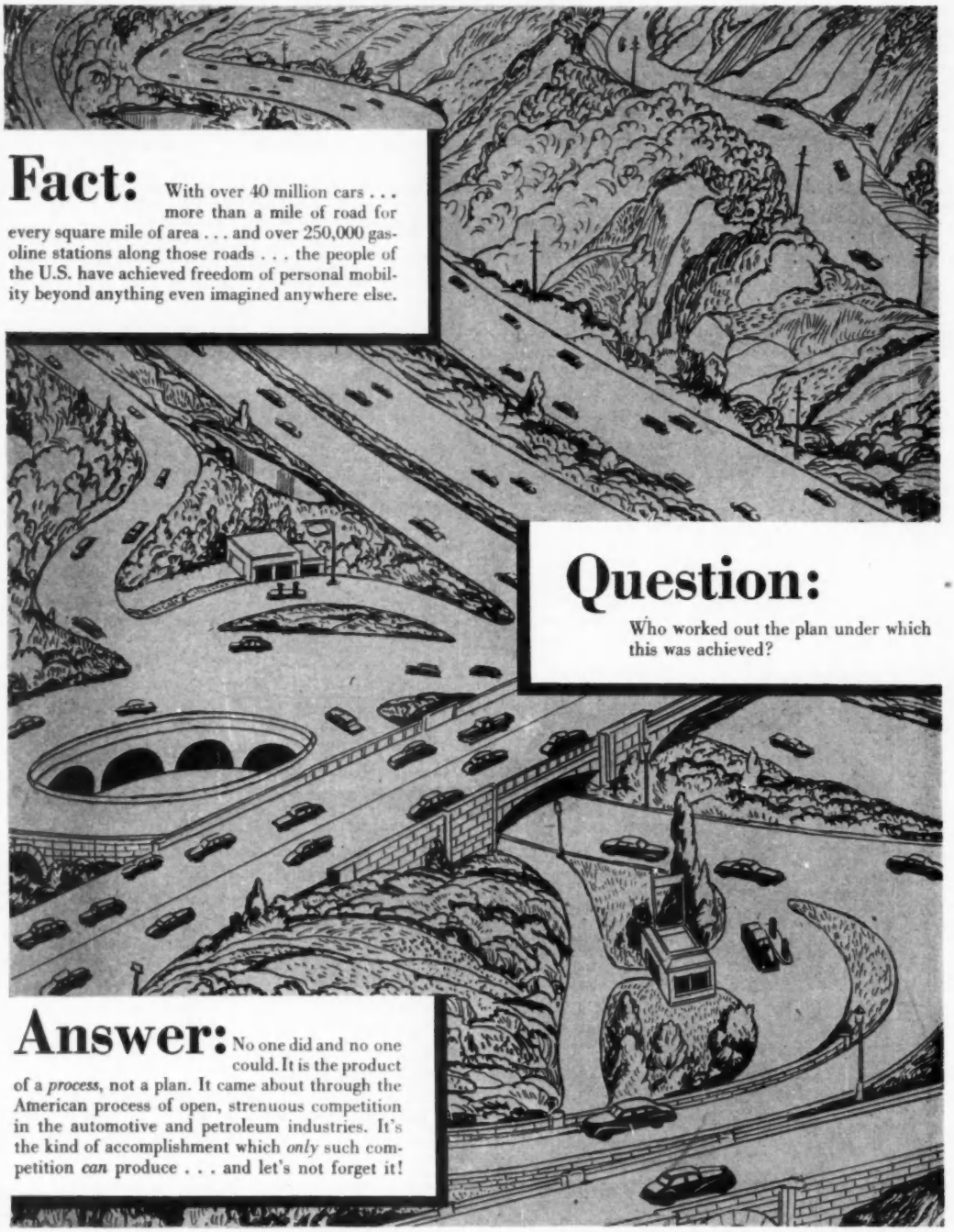

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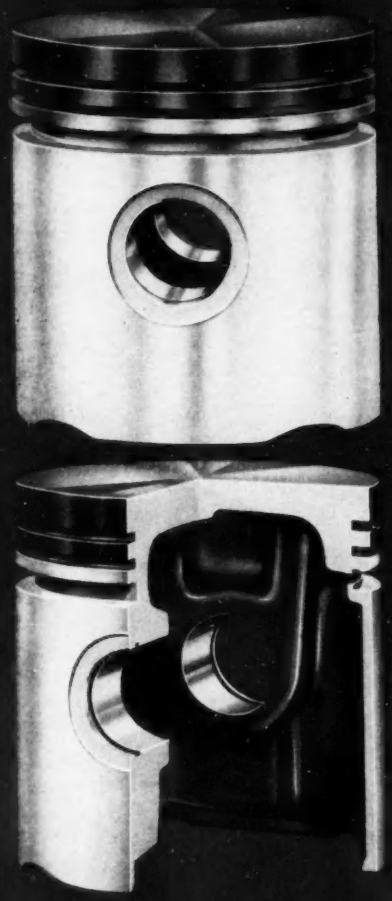

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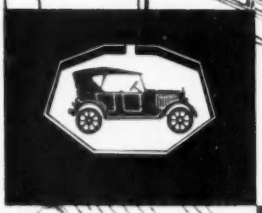
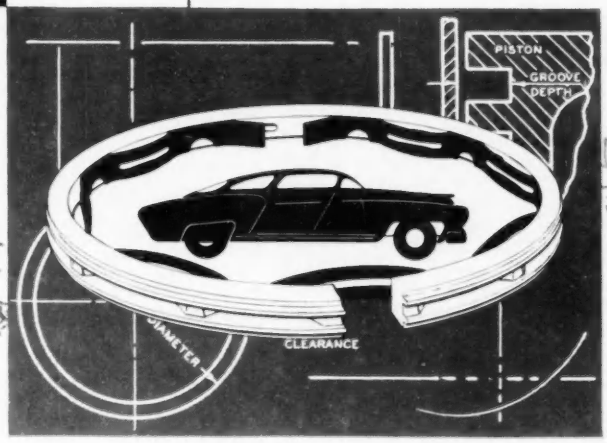
by the toughest judge of all . . .





THE toughest judge of piston ring engineering is the actual *performance* of the rings, year after year, over billions of miles, in millions of cars, trucks, buses and tractors, under all types of service conditions . . . in straight cylinders and worn ones . . . on new or worn pistons . . . over hot desert sands and in sub-zero areas . . . through mountainous terrain and flat country . . . meeting constantly changing engine requirements, new fuels and lubricants.

For over 25 years, Ramsey Engineering has proved its merit and the correctness of its design by successfully meeting all the tests of this "toughest judge of all." Basic to the design of every Ramsey Piston Ring which has passed this test through the years is the principle of Piston Stabilization.

This Ramsey-originated method controls wall lubrication and blow-by through piston stabilization, rather than by primary reliance on high cylinder wall pressure. This "kind-to-cylinder-walls" method actually *curbs* wear instead of *causing* wear.

We welcome your inquiry regarding the employment of Ramsey's time-proven ring design in your original equipment, replacement or other applications. Address your requests for more details to: Ramsey Corporation, St. Louis 8, Mo.

Original Equipment and Replacement

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